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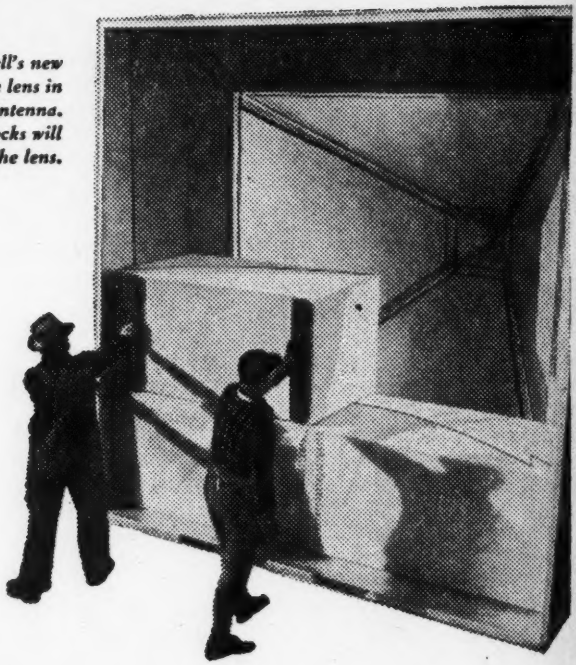
The American Society for Engineering Education

Mounting Bell's new microwave lens in a horn-lens antenna. Other blocks will complete the lens.



A focus on better, low-cost telephone service

In the new microwave radio relay system between New York and Chicago, giant lenses shape and aim the wave energy as a searchlight aims a light beam.

Reasoning from the action of molecules in a glass lens which focuses light waves, Bell Laboratories scientists focus a broad band of microwaves by means of an array of metal strips. To support the strips these scientists embedded them in foam plastic which is virtually transparent to microwaves. Rigid and light in weight, the plastic is easily mounted on relay towers.

This unique lens receives waves from a wave guide at the back of the horn. As they pass across the strips, the waves are bent inward, or focused to form a beam like a spotlight. A similar antenna at the next relay station receives the waves and directs them into a wave guide for transmission to amplifiers.

This new lens will help to carry still more television and telephone service over longer distances by microwaves. It's another example of the Bell Telephone Laboratories research which makes your telephone service grow bigger in value while the cost stays low.

BELL TELEPHONE LABORATORIES

Working continually to keep your telephone service big in value and low in cost.

Fran

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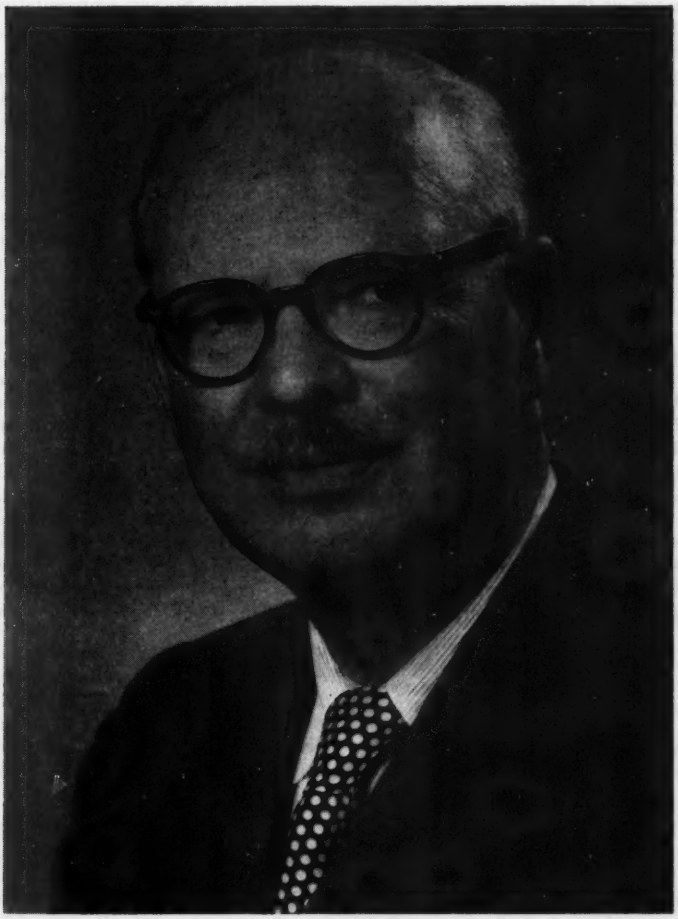
Francis M. Dawson, President, ASEE, 1950-51



President F. M. Dawson was born in Nova Scotia on September 3, 1889. He graduated in civil engineering from the Nova Scotia Technical College at Halifax in 1910, and three years later was granted the degree of M.C.E. by Cornell University. His military service during World War I involved over four years of active duty, primarily with the Canadian 8th Engineer Battalion as Captain and

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Adjutant. Directly before and after the war he spent four years on general construction projects.

He began his teaching career in 1921 as an assistant professor at Cornell University, becoming in 1922 Professor of Hydraulics at the University of Kansas, in 1928 Professor of Hydraulic and Sanitary Engineering at the University of Wisconsin, and in 1936 Dean of Engineering at the State University of Iowa. The Schoder-Dawson book on "Hydraulics," has been a standard text for many years, and the Dean is also author of the hydraulics section in O'Rourke's "General Engineering Handbook" and of numerous technical papers.

Dean Dawson was a vigorous promoter of the Engineering College Research Association, and became the Vice President of the Society and Chairman of the Engineering College Research Council when it merged with the ASEE. He was re-elected to this post two years ago. Through his efforts on the Research Council, he has taken an active part in promoting the adoption of the National Science Foundation legislation, as well as other legislative programs relating to engineering and engineering education. Under the leadership of Dean Dawson, the Research Council has established committees on Relations With Military Research Agencies, Non-Military Research Agencies, and Industrial Research Agencies, and has also published a number of significant reports, including the Proceedings of the Research Council and the Directory of Research. For the past two years he has served as the Society representative to the National Research Council.

His membership in some ten professional societies includes, in addition to the ASEE, the ASME, ASCE, AWWA, AGU, and AAUP. In many of these he has held important offices, principal among which were the presidencies of the Central States Sewage Works Association in 1938, of the Iowa Engineering Society in 1940, and of the Engineering College Research Association from 1946 to 1948.

Dean Dawson's many years of service to national, state, and municipal organizations are distinguished by his contributions to the American Standards Association, the National Resources Planning Board, the Army specialized Training Program, the Iowa Natural Resources Council, the Iowa City Chamber of Commerce, and many other state and National Committees. He is Director of the Iowa-Illinois Gas and Electric Company and the Iowa Water Service Company and is Chairman of a National Plumbing Code Coordinating Committee.

Editorial

By F. M. DAWSON

President of ASEE and Dean, College of Engineering, State University of Iowa

That we are moving through dangerous and stirring times is generally acknowledged, but it is not so generally known that we have for guides a series of comprehensive studies dealing with the direction in which our nation is going. These investigations have not been well publicized, and furthermore it is not at all certain that our governmental officials will follow them. However, of greatest importance to the faculties of the colleges and schools of engineering and technology are the studies made by committees of our own society. The reports of each committee should be closely examined and I suggest that each school should devote at least one faculty meeting to a discussion of the pros and cons of the following reports:

(1) Report of the Investigation of Engineering Education (1928–29).
(2) Report of Committee on Aims and Scope of Engineering Education (March 1940).
(3) Report of Committee on Engineering Education After the War (May 1944).
(4) Education for Professional Responsibility (Carnegie Press, April 1948).

Your society has a strong committee under the chairmanship of Professor L. E. Grinter now working on a study for "The Improvement of Teaching." This committee will certainly bring forth stimulating ideas for the improvement of our work. First and foremost we should be good teachers.

From a Canadian university comes a significant statement of policy which is worth repeating, and though general in scope, is may be applied specifically to engineering. It is wise to go back to a consideration of basic principles particularly now when we are making an effort to enrich our program for all types of engineering education.

"There should appear at the outset a carefully defined set of principles around which the functions of the various faculties revolve. Those principles, which apply with such vigor to higher education may properly be recorded here.

"First, a university is an association of scholars devoted to teaching and research.

"Second, a university is a school for the training of the mind, based on the assumption that a proper development of the intellect is required for the full life of man and for the improvement of society at large.

"Third, a university is an institution which offers instruction in certain kinds of professional knowledge and skill, by which the student may afterwards earn his livelihood and contribute to what Bacon calls 'The relief of man's estate.'

"Fourth, a university is an agency which enables each new age to enter into the fulness of its cultural heritage."

In these momentous years, ASEE will continue its work of providing a means through which teaching in all colleges and schools of engineering and technology can be continually improved.

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Engineering Education in a Changing World*

By THORNDIKE SAVILLE

President ASEE (1949–50);
Dean, College of Engineering, New York University

"Times change and men change with them": So also must education change to prepare men to cope with changing times—education in its proper sense—not the mere communication of knowledge, but the discipline of the intellect and the establishment of principles. Engineering education is the most complex and the most sensitive to social and political considerations of any of the professional disciplines, for while law is based primarily upon interpretations of past decisions of the courts and medicine is chiefly devoted to the skillful applications of science to the individual human body, engineering is concerned on the one hand with the practical application of the natural sciences to the use and convenience of man and on the other hand to the implications of economics and of sociology upon the operation and control of engineering works and devices.

Engineering education has perforce to be fluid, and this Society has always been prompt to relate the basic premises and curricula of engineering education to realistic appraisals of changing times and needs. Four epoch making reports of the Society bear testimony to this: "Study of Engineering Education" (1918), "Investigation of Engineering Education" (1929), "Aims and Scope of Engineering Curricula" (1940), and "Engineering Education after the War" (1944). A scrutiny of present committee activities will indicate that the Society continues to be alert to the pressures of changing conditions upon engineering education.

Dynamic Influences Affecting Engineering Education

Engineering is alone among the recognized professions in not requiring more than four years of formal education for the majority of its practitioners. The physicist, chemist, or biologist as well as the doctor, or lawyer, or clergyman is ordinarily expected to have had one or more years of post-graduate study. On the one hand engineering is applied science. Each new advance in science, and science is expanding with bewildering rapidity, creates new potentialities of application which sooner or later must be reflected as an addition to engineering education. On the other hand engineering is applied economics, applied sociology, and sometimes applied politics. Each new concept of decreased working hours, higher wages, more recreation, increased agricultural development, improved working conditions, housing, conservation of natural resources, etc. has its effect upon the design and operation of great engineering works, an effect which must be reflected to some degree in engineering education. The engineer must be competent not only to apply to science but to apply it with some knowledge of its economic and social effects, else he will not design or operate in the best interests of society.

In all this we are merely educating a student for a profession. Nothing has been said of his education as a citizen. There are peculiar responsibilities of the

*Presidential Address, Annual Meeting of the American Society for Engineering Education, Seattle, Washington, June 1950.

engineer as citizen, *because* he is an engineer. A distinguished past president of this Society has said "we are living in a remarkable age, an age different from any that has preceded it in the history of the world, and one in which changes are taking place with marvelous rapidity. As a profession we are largely responsible for the present conditions, and therefore we should do our part in solving such problems as exist, and in helping to direct the tendencies of the day. We have a duty to ourselves, to our profession, to society, and to our successors, and we must perform it." I am sure that you are trying to guess which of my immediate predecessors made this observation, so apropos of our profession in post World War II days. It was not made even of post World War I days. It was made by George Fillmore Swain, in an address given in 1913, thirty-seven years ago. I am quite certain that one or more of the distinguished speakers today will make similar observations. That is because what was true in 1913 is even more obvious today when engineering has come of age, when engineers occupy an increasingly influential position as scientist-citizens.

No wonder that we who are responsible for the professional education of engineers are somewhat bemused at the admonitions we receive from our well-wishers. The executive of a great industry wishes our graduates, who are to succeed to management of his enterprises, to write well, to speak well, and to be broadly grounded in both the science and techniques of our profession. They put scientific and specialized knowledge well down on the list of desired attributes. The employment officers of the same corporation offer priority jobs to our graduates if they have had the latest speciality in their curriculum in electronics, soil mechanics or nuclear physics. Certain government agencies want to know if our graduate-applicants are in harmony with the social or economic objectives of this or that agency. Some of our speakers today will urge that we take more time to inculcate in our students ideas of participation in public affairs, of the opportunities for government service, of our international responsibilities as engineers. A year ago industry was represented here, and eloquently told us of the perils besetting the private enterprise system, of the obligation of engineering education to train its disciples in "sound" economics, and the like.

Because of the dual role of the engineer as applied scientist and as manager of industrial and public works we are certainly an unique profession with great opportunities for professional satisfaction and for service to society, but as engineering educators we have long been placed by our diverse well-wishing advisers upon the horns of a dilemma, the compromise between the physical and the social sciences, and never more so than today.

It would be nice if we could teach and indoctrinate all these desiderata. But we can't put everything in the curriculum. I mention curriculum because that is where most of our critics begin their diatribes upon engineering education. Of course there are some minor (1) problems of competent faculty, adequate facilities, student guidance, and the like but generally it is thought that all would be well if we just put in the curriculum all of the things which each critic felt would make a well grounded engineer and of course all in four years.

Technologists or Engineers?

However, the curriculum is merely the machinery by which we implement our philosophy of engineering education. Engineering as a profession occupies a middle ground between technology and science. A middle ground both geographically and philosophically is that which is occupied by the greatest number of people. There are many in this audience who will dispute the latter statement. They will refer to studies and polls and reports which indicate that there is need for three to ten times the number of subprofessional personnel auxiliary to engi-

neering as there is for engineers. It is maintained that this auxiliary personnel can be and should be trained by two year terminal courses. This Society's famous report on "Education After the War" points out that in practice "the relative numbers of individuals trained for subordinate technical positions in this country in comparison with engineering graduates is in inverse proportion to the needs." In spite of the impetus which this and other reports have given to the establishment of technical institutes, in spite of the expanding needs for both technicians and engineers, the situation as to relative numbers being trained and educated remains substantially unchanged.

Our philosophy does not appear to be in accord with the facts of life, and perhaps we should re-examine our philosophy. In the first place it seems to me that there is a carefully unexpressed but nonetheless implicit supposition abroad that young men and women seeking to prepare themselves for a career in which a basic education in technological and scientific subjects will be useful can be compartmentalized at the outset; that of a given number of such high school students we may say that 20% should terminate their formal education upon graduation, that 40% should terminate their education by means of a technical institute program, and that the remaining 40% should complete at least a four year college program preparatory to engineering or physical science. The percentages may be all wrong, but the idea is there.

I submit that this idea is unsound, even if by some different and better philosophy the percentages remain the same. The idea is not consonant with a democratic society in which free choice of an occupation is paramount, free choice to try and if necessary by competition to fail. Furthermore, it is predicated upon an equally erroneous idea that we have test procedures by which we may guide young people into the careers for which they are best fitted thereby preventing the frustrations and dissatisfactions attendant upon failure. As yet, we have no tests of sufficient precision to warrant this. Available tests may help but they do not determine. And what of the frustrations attendant upon those persuaded to embark upon terminal two year programs who are discovered subsequently to be capable of pursuing engineering education and find that they have in essence to start all over again in the freshman year if they wish to study engineering?

Then there is the supposition that the draftsman, the surveyor, the inspectors, the "minor industrial supervisors," etc. do not require a four year engineering course, that in effect they would be wasting their time and their own or someone else's money. Who can say that people in these occupations, if engineering college graduates, *have* wasted time or money? May they not be more useful, as well as happier and better citizens? *Must* they be frustrated because they have not climbed to the top of the ladder? Moreover a distinguished engineer has recently observed that "many mechanisms formerly handled by technicians have become so intricate that they are now beyond the understanding of any except graduate engineers."

Compartmentalization or Integration

Finally, there is already apparent a tendency to merge the technological institute with the junior or community college, or to create the latter out of the former. We have as useful and stimulating groups in this Society a Division of Technical Institutes and a Committee on Junior Colleges. Their separate and joint discussions have indicated uncertainty as to respective well defined separate functions.

Let us be frank. Again one of the publicly unexpressed but implicit philosophies of the interest which some of us have expressed in the Technical Institutes may perhaps have been to recognize them as a growing force, to even give them standing by accreditation through the Engineers Council for Professional Development, and thus keep them in a

respectable but carefully circumscribed compartment, so that their ambitions would not lead them to become additional and perhaps inferior four year engineering colleges. We thus tacitly recognize that able and intelligent young men, urged on by an able and ambitious faculty, are likely not to be content with enforced compartmentalization. On the other hand let us be equally frank with respect to some of these two year colleges. Evidence exists that in too many instances certain of their students have been badly advised if not misled into sincerely believing that their present curricula, particularly in some technical institutes, are quite the equivalent of the first two years in an engineering college. Such is generally not the case at present, and many heartbreaks would be avoided if some of the faculty of these institutes and colleges would advise their students more fairly and realistically.

Oliver Wendell Holmes says in his "Poet at the Breakfast Table" that there are "one-story intellects, two-story intellects, three-story intellects with skylights. All fact collectors, who have no aim beyond their facts, are one-story men. Two-story men compare, generalize, using the labors of the fact collectors as well as their own. Three-story men idealize, imagine, predict. Their best illumination comes from above through the skylight." Here, it seems to me we have those who should terminate their post high school education in two years, those who should complete a four year engineering course, and those who should go on to post-graduate work.

Therefore, to return to the basic philosophy of engineering education, I believe we should expand the leadership already shown by so many of our prescient leaders who have concerned themselves with the place of technical institutes in engineering education. I believe we must bring our influence to bear, and promptly, upon the state educational systems to reduce this compartmentalization, and to integrate so far as possible the pre-engineering aspects of the technical institute, and the junior and community colleges, into a broad all-embracing program of engineering education.

Let engineering education enlarge its responsibilities and take into the fold as partner, not as step-child, these lusty youngsters. This harmonious partnership is well under way in California. It can most readily be accomplished under the great state university organization in effect there. It will be more difficult in the eastern states where as yet the great state university systems are a cloud on the horizon. But this is an ominous and growing cloud for many privately endowed engineering colleges, and in their own interests as well as from a sound educational philosophy the problem must be met. Nor is this cloud to be ignored by those state institutions who presently dominate engineering education in their regions. The growth of community colleges and technical institutes, if not integrated with the engineering education process, will result in dissipation of taxpayers' money and ultimate weakening of the support and performance of engineering colleges.

It is not possible nor feasible here to give the details of what I mean by "integration." Broadly I suggest that we proceed to re-examine our curricula, and to inspire changes in the curricula and the procedures of the two-year terminal programs to the end of greater flexibility. Let us provide a constant interchange of goodwill as well as of students. Let us not shackle two- and three-story men in two year programs so that ultimate achievements to which their latent talents entitle them are denied them by too great expenditures of time and money.

Rigidity of the Engineering Curriculum

Of course this brings me to the engineering curriculum, one of the chief subjects of study by many distinguished committees of this Society. In spite of numerous exhortations to the contrary undergraduate engineering education remains in general conventional, compartmentalized, static, and unimaginative. It

does not reflect adequately the dual role of the professional engineer as described previously. It is rigorous, competent, sincere, and designed well to produce immature specialists immediately useful to their employer if there is a particular specialist job available. It does not provide adequately for the transfer of competent students from two-year community colleges or technical institutes. It does not provide for sufficient basic science or even basic engineering. It rushes through rigidly prescribed courses with few free electives in either the humanistic-social studies or in engineering. It assumes that a young man knows by the junior year, and in an increasing number of cases by the sophomore year, that he wants to be a civil, electrical, or chemical engineer. It then chains him to that curriculum making any later change most difficult. In short it ignores many of the profound and sensible recommendations of the "Report on Aims and Scope of Engineering Education" published by this Society ten years ago. Let me quote just one recommendation of that report: "Some of the advanced technical subject matter now included in undergraduate curricula should be transferred to the post-graduate period where it may be pursued with a rigor consistent with preparation for engineering specialization." I fear there has been almost a contrary tendency in some of our curricula.

I have deliberately overdrawn the gloomy side of our curriculum situation, because I felt that it is high time we shocked ourselves into an objective reappraisal of our philosophy of engineering education and of the means by which we implement that philosophy. If we are "to educate" as distinguished from "to train" our future engineers I think we have to recognize more clearly the dual role which we have; that on the one hand as applied scientists we require ever more fundamental science; that on the other hand as managers of industry and of public works and as citizens we need more selection and breadth in our education.

Current Trends in Engineering Education

Early this month I attended a meeting sponsored jointly by this Society and by the Atomic Energy Commission to conduct an initial exploration as to the education required for engineers who are to participate in the design, construction, and operation of structures and devices connected with the use and control of nuclear energy. Five deans of engineering schools from five widely separated regions of this country seemed to agree with the pronouncement of one of them to the effect that the day had about gone by when an undergraduate, or perhaps even a graduate, should be educated as a specialist in a given branch of engineering. It was felt that the time he spent in college, whether four or more years, should be devoted to giving him a fundamental background in different aspects of engineering and science, and that the 10% more he needed to become a real specialist he would get by himself later. I did not understand by this that there was a proposal to educate all engineers to a pattern, but that there should be greater uniformity in undergraduate engineering education to provide the greater fundamental background and breadth of outlook to the end of greater versatility at the end of four years, and a better foundation for graduate study if he continued his education beyond the first degree.

Two years ago I ventured a proposal for a new type of undergraduate engineering education in a paper before a Division of this Society. Briefly this envisioned a nearly uniform three year program, adapted on the one hand to interchange of students with two-year colleges and institutes, and on the other hand to a broad fundamental program of science, engineering and the non-technical studies designed to prepare for *any* career where a college education was required or desirable. At the beginning of the senior year some students would elect a largely non-scientific technical year to end their formal engineering education and be prepared to enter a great

variety of occupations where further engineering study was not required. The others would by aptitude and particular abilities then take their fourth year as beginning specialists in a given branch of the profession. Both groups of fourth year students would have many electives in their respective fields, both would receive upon graduation an undesignated Bachelor of Engineering.

The applied science group would expect to go on for a fifth year, also with electives, to receive their first designated degree in a given engineering field. This is not the place nor time to present arguments for such a plan, nor is this the only plan suggested to work major changes in our conventional engineering curricula. Other approaches are already under way in a handful of institutions. But time is running out, and as a group we must be bold and imaginative if we are to adapt engineering education to meet the needs of our country and to enable our graduates to take the places in society to which they aspire.

This brings me to say a word about our faculties, for any kind of education is no better than the men directing it. The ideal instructor is first of all a specialist, yet with a broad outlook on the whole educational horizon. He is a scholar, yet with attributes of an engaging personality. He is a skillful and inspiring teacher, yet with interests in public affairs. He is engaged in research, yet not indifferent to administration. With our faculty as with our curriculum we have to compromise, and also may I add with the attributes of our engineering college administrators! But it is necessary to compromise, and if I have any plea at all to make here today it is to urge the great body of our membership, constituting the democratic arbiters of policy and curriculum, that they do evince a willingness to compromise, for only by compromise between established shibboleths of the past and the visionary ideals for the future many we attain a practical and improved education for the present.

Preparation for Public Service

For many years the chief thread which has run through the studies and reports on engineering education was our responsibility to train for industry. Last year the keynote of the general sessions of the Society was Relations with Industry. Due in part to the initiative of my immediate predecessor we have a recently created, active, and effective Division of the same name. This year it seemed opportune to me to put more emphasis upon our relations with Government. Increasingly as government on all levels takes over more and more enterprises of an engineering character, a greater proportion of our graduates enter public service. We are to have addresses today and tomorrow night from engineers who have distinguished themselves in various fields related to government or to national policies. The Society must perforce give more attention to such matters. We have a number of committees dealing with specific government relations, such as research and military affairs. However, there are many general problems before us where government activities, especially those of the Federal Government, may profoundly affect us, and where we can contribute powerfully to guiding public policy. We took a positive and purposeful stand on the Science Foundation Bill, which is now law. We should participate energetically in the more nebulous problem of planning for use of our facilities, our staffs, and our students in the event of a national emergency. Such planning seems sorely absent in Washington, and we should insist on stimulating it. Various acts of Congress, such as the Point Four program, open up spheres of usefulness to us on an international scale.

Speakers to follow me will be better informed and more eloquent that I in pointing out opportunities in government, in international affairs, and in public affairs. But I wish to re-emphasize the exhortation of Professor Swain which I quoted, and apply it particularly to the

members of this Society. We have not only a general obligation as engineers, but a particular responsibility as engineering educators to participate in these areas of public service.

As life upon the local, national, and international level becomes more complicated, it requires in general more consideration from engineering educators to relate their responsibilities to the ever-changing, ever more complex scheme of things. I have touched upon a few of our larger problems in what I have said. I am sure that Dr. Bronwell's account of the activities of various of your Divisions and Committees and of your officers during the past year will make it apparent that never has your Society been more alert to all of the many facets which impinge upon engineering education, never have more members labored more earnestly and to better purpose than during this past year. New problems constantly beset us. With good will, with vision, with compromise, with even greater participation by more members of the Society we shall surmount them all. No professional group can have a greater variety of challeging problems to solve of great public as well as educational consequence. No group has greater opportunities to exert a significant influence upon the national economy and welfare. This challenge we shall meet, for we are the servants of society, the bond servants of science.

You Will Want To
Reserve This Date.....

JUNE 25-29, 1951

Annual Meeting

Michigan
State
College

East Lansing, Michigan

Reorganization of the Federal Government*

By RAYMOND B. ALLEN

President, University of Washington

Gentlemen, you are engineers, you are educators . . . you are also citizens. What I propose to say to you this morning will be important to you, I hope, in all three roles.

First let me formulate, for your consideration, something of my own philosophy of the role of education in the rapidly changing world of today. I think I may say, with all due regard for the other forces directing American life today, that we educators have a tremendous—perhaps the primary—influence in determining the pattern which life in the United States will take in the years ahead. "We have this influence" . . . I should say, rather, than we *can* have this influence, if we exercise the power and responsibility which is ours. If we do not, I must warn you that there will be others —perhaps with less high-minded objectives—who will exercise them for us, and to the detriment of the nation as a whole. What we do in our classrooms, and through the myriad other educational channels at our disposal, may well determine the future course of our country as a democracy. And in an era when that democracy is threatened by a variety of totalitarian influences, our work is more important than ever before.

Peaceful Rebellion Leads to Progress and Stability

In that context, then, let me say to you with all the sincerity at my command that our responsibility is to plant the seeds of peaceful rebellion. For only in rational rebellion—in continued questioning of authority and a constant seeking for better and more effective ways to achieve the objectives of our democratic society —is there any real hope for the perpetuation of that society. Abraham Lincoln, in his first inaugural address, made very much the same point when he declared:

"This country, with its institutions, belongs to the people who inhabit it. Whenever they shall grow weary of the existing government, they can exercise their constitutional right of amending it, or their revolutionary right to dismember it or overthrow it."

This statement, may I remind you, was made by a President of the United States, a man whose primary concern was with preservation of the Union . . . and made, too, at a time when the nation was struggling to maintain its unity and indeed its very life. Yet so strong was President Lincoln's faith in the democratic process that he considered it desirable, at that critical juncture, to restate man's fundamental right to be free even from the restraints of the very government he had created.

Now certainly we may all hope—and I personally believe—that it will never be necessary for the American people to exercise that "revolutionary right to overthrow" their government. For myself, I am confident that our system is sufficiently flexible to permit ordered, reasonable change. But I do contend that unless we encourage in our students the attitude which *welcomes* change—which indeed, actively questions all established dogmas and formulas—unless we do this, I say, we are paving the way for acceptance of

* Presented at the General Session of the Annual Meeting in Seattle, Washington, June 21, 1950.

a pattern of authoritarianism which may destroy our system.

Self Government a Vital Element in Education

The primary business of education is to train people to think. Obviously this is dangerous because there will be those students who never survive to good citizenship . . . but the risk must be taken. It is generally recognized that students must have the opportunity to test ideas in their own experience. This is the purpose of the scientific laboratory. This is why doctors serve internships under expert supervision. This is why students training to be engineers, teachers or businessmen, or professional men do field work to gain practical and necessary experience. And so it is in the area of government as well. To my mind, it is more important, for example, that students should have a substantial measure of self-government in their affairs as students, even though this may mean some unsound decisions, than that they should have all the "right" ways pointed out to them by older and presumably wiser heads. Far better that they should make their own mistakes, and in the process learn how to govern themselves and their fellows, than that they should have "The Truth" imposed upon them by those whose theoretical wisdom stems from longer experience in the affairs of men.

True, there must be some limitations that will keep the socially and politically immature student from doing harm to himself and to others. Teachers, supervisors, parents, business and professional men, and all people of good will, must guide the young during this difficult adjustment. But unless the guidance is provided in an atmosphere of tolerance, even encouragement, for conflicting ideas, there can be no hope of developing intelligent adults properly equipped to take their place as leaders in our society.

This is not an easy philosophy of education to accept. The easy way is the way of authoritarianism. This is the seductive road to totalitarian dictatorship, which leads to human degradation. If we have the faith of our fathers, we shall take the hard way, the way of independent thought and action; we shall guarantee for our children freedom of thought and expression, freedom of questioning and action, thus guaranteeing them an opportunity for the good life each according to his abilities and his merits.

Democracy is not an easy or an idle way of life. It requires that all of us accept our full responsibilities in the affairs of the society of which we are a part. Ours is not a freedom from, but a freedom for. As Thoreau put it, "Be not simply good, but good for something."

I have been very much heartened, during the past year or so, at the widespread and enthusiastic response of the American people to what might be considered a proposal for revolution. I refer to the findings of the Commission on Organization of the Executive Branch of the Government, popularly known as the Hoover Commission. It is encouraging too, in the light of what I have been discussing, that there is substantial interest among the students of our country in the findings of the Hoover Report. Indeed, the national Citizens Committee for the Hoover Report has an active Committee working with high school and college leaders throughout the United States, to bring to the students the facts and conclusions which resulted from the study. This is indispensable subject matter for all studies pointing toward good citizenship.

Assignment of the Hoover Commission

As you doubtless know, the Hoover Commission was created in 1947, by unanimous vote of the Congress, that it had from the start the full approval of President Truman, that its membership was thoroughly bi-partisan including six Democrats and six Republicans, that its chairman was the only living ex-President of the United States, Mr. Herbert Hoover.

The Commission's assignment appeared simple enough: To discover how well or how badly our Federal Government was organized and managed, and with thor-

ough objectivity to recommend the ways in which it could, over the long run, be improved from an operational and management point of view.

The basic conclusion of the Commission was also simply stated, but it carried a severe indictment as well as a glowing challenge to our people: *"The nation is paying heavily for a lack of order, a lack of clear lines of authority and responsibility, and a lack of effective organization in the Executive Branch."*

This was no criticism of any individual, for no one person, no one political party or administration was to blame for the situation the Commission found. The crisis reflected in the Hoover Commission's Report has been brewing for many years, and was a result not of any specific action, but rather of *lack* of action, lack of proper planning, during the decades when the Government was changing in response to changing needs.

Our nation today has—and is paying for—Big Government. Yet Big Government, I contend, is not bad in itself. The United States is no longer, as it was one hundred sixty years ago, a loose affiliation of ex-colonies clustered on the Eastern seaboard, with a population of some three million and an economy largely agricultural. Today, with 150 million people, spread across three million square miles and engaged in a highly diversified as well as a highly mechanized economy, we *need* Big Government. Our nation's domestic problems, to say nothing of its responsibility in world affairs, would stagger Paul Bunyan; and it requires a government of equal proportions to cope with these problems when local and state government cannot deal with them.

Big Government, however, need not be inefficient government—and here is the heart of the Hoover Commission studies. When the Commission was organized, it established twenty-four research committees, known as "Task Forces" and employing the voluntary services of some 300 experienced specialists in various fields of management and administration, to inquire into the facts of structure and organization in the government's Executive Branch. The task force, findings, later analyzed and interpreted by the Commission itself, represent the most complete and thorough-going study our nation has ever had of the management of our government and the defects in its structure.

More than eighteen months after the Commission came into existence, it submitted its final reports to Congress . . . and incidentally returned the unspent remainder of its two million dollar appropriation. In nineteen volumes, the Commission tore the government apart, found what makes it tick, and offered more than three hundred recommendations for making it tick better.

Now it is true that some of the Hoover Commission proposals are highly controversial. It is true, too, that there was disagreement even among the Commissioners themselves on some of the recommendations, with minority as well as majority reports being filed. I do not stand before you today to say that the Hoover Report is an inviolable blueprint for sound government. It does, however, point the way toward intelligent reorganization of the Executive Branch. Many of its proposals are so patently right that they leave virtually no room for argument. Others represent a good starting point for reorganization, with the details to be hammered out by Congress and the President, in response to the wishes of the American people.

Implementation of the Hoover Report

Indeed, a great deal has already been accomplished toward implementing the Hoover Report. To date, in just one year, at least five major bills have been enacted into law, all aimed at providing us with a more efficient and incidentally, a more economical government. The most important were the laws unifying the armed services in a National Department of Defense; establishing the General Services Administration to combine purchasing functions, records, building management, and war assets disposal; ap-

proving of pay raises for top government officials and improving the Civil Service Classification Act; strengthening the staff of the Secretary of State; and empowering the President, through the Reorganization Act of 1949, to submit plans for realignment of Executive agencies and bureaus. Additional bills of considerable importance, notably in the areas of Postal and Civil Service reform, Accounting and fiscal procedures, are currently awaiting action in the Senate and House of Representatives.

One of the proposed measures which has received comparatively little attention, but which I consider highly important, would create a new Commission, along the lines of the original body, to explore the vast area of Federal-State Relations, with special emphasis on fiscal relationships. Such an inquiry was recommended by the Hoover Commission itself, which acknowledged the importance of the subject but felt it should be studied as an independent matter.

In addition to the legislation enacted or now pending, numerous steps toward governmental efficiency have been taken under the Reorganization Act of 1949. Thus far, the President has submitted 34 specific proposals to the Congress for reorganizing various units of the Executive Branch. On every such plan, the law provides that it shall go into effect sixty days after submission, unless previously rejected by one House or the other of Congress. Of the 34 already sent up by the President, only six have been rejected, fifteen are in effect, and the remaining six are still under consideration. Moreover, the President has indicated that other proposals will be forthcoming.

In sum, approximately 35 per cent of the recommendations of the Hoover Commission have already been effectuated, and with further action expected at this session, the indications are that better than one-half of the recommendations will have become law. This achievement, in little over a year, is all the more remarkable because even the best friends of the Commission said that fifty per cent in *ten* years would be a high proportion to expect.

Reasons For Success

This is indeed an astonishing and heartening record. Authorities on the history of our government are agreed that never before has there been so great and so constructive an achievement toward reorganization, in so short a time. To what may the accomplishments be attributed? I would name several factors:

To begin with, as Charles B. Coates, the general manager of the national Citizens Committee for the Hoover Report, said in Seattle a few weeks ago, "The time was right." Everyone had become aware that our Federal Government, in its vast growth, had developed into an unwieldy and chaotic structure. The impact of depression, war and postwar adjustments had created a vast and unmanageable piece of machinery, and the cogs had begun to slip. Meanwhile, the United States was accepting an ever-growing role in world affairs, and was simultaneously being subjected to pressure from the more highly organized (and *apparently* more efficient) nations of totalitarian bent.

Secondly, among the influences for acceptance of the Hoover Report, I would cite the bi-partisan and high-minded efforts which characterized the work of the Commission from beginning to end. Hundreds of men, with vast experience and tremendous abilities, labored long hours, under the inspired leadership and example of Mr. Hoover and with the full encouragement of President Truman, to evolve an orderly pattern of government without regard for partisan or political considerations. Finally—and this, to my mind, was the over-riding influence—there has been a genuine and enthusiastic response from the American people.

To me, the interest shown by the people of our country in what was, after all, a rather unglamorous and difficult subject, has been the greatest living proof that our democratic system does work.

Thousands upon thousands of thoughtful letters have been sent to Congressmen by citizens in all walks of life; millions of signatures have been affixed to petitions circulated by such public-spirited organizations as the Junior Chambers of Commerce of the United States; there have been countless meetings, discussions, study groups, devoted to the issues raised by the Hoover Report.

Washington State Committee

Much of this interest has been spontaneous. More of it, perhaps, has been generated by the 40-odd citizens' committees, on state and national levels, unselfishly concerned with the promotion of sound government. I have mentioned the national Citizens Committee for the Hoover Report. Let me cite the experience of a group in our own state—the Washington Committee on Federal Reorganization, of which I have the honor to be chairman.

On our executive committee we have conservatives and liberals, educators, businessmen, labor union officials, clubwomen, and representatives of other viewpoints. Because of the diversity of this group's interests, and because of our faith in the basic intelligence of the American people as represented in our own State of Washington, we early decided that we would not attempt to dictate to our fellow citizens what course should be taken. Accordingly, in a Statement of Objectives adopted before our program was launched last year, we said, in part:

"As a committee, we do not favor or oppose any specific recommendations for reorganization of any particular department. Our concern is, rather, to acquaint the public with the problems and issues involved, and with the facts on which our fellow citizens may base their own decisions. Our mission is purely educational. It is the duty of every citizen to study the problems of government.

"It is our conviction that through the program of public information, education and discussion, sound opinions will be formulated on the far-reaching implications of the comprehensive report, and that as a result, legislative and executive action can be obtained which will greatly benefit the entire nation."

This salutary policy of emphasis on education rather than propaganda has proved its value completely in the months that have passed. The response, I assure you, has been most gratifying. We have received expressions of interest and requests for factual information from hundreds upon hundreds of individuals and organizations of every type. Money has flowed in, in the form of dollar bills and small checks, to help support our work, though we have never made a general appeal for financial contributions. I cite this not to show how easy it is to raise funds—for I am sure you know it isn't—but as evidence that there is a genuine, grass-roots interest in the subject of how our government can be made to function more effectively. Volunteer speakers, many of them enlisted for our committee by the board of governors of the Washington State Bar Association, have delivered scores of talks before all manner of organizations and in every corner of our state. Factual literature has been distributed in the thousands of copies, often through the cooperation of such diverse groups as the labor unions, banks, department stores, farm organizations and Parent Teacher Associations.

For me, this tremendous response points to the fact that there is indeed among the people of the United States a very real interest in their government. They *believe* in the democratic system; they want to *make* it work.

The Challenge

And that, gentlemen, is why I open these remarks with a challenge to you as educators and citizens. For if we who are guiding the minds of the young do not provide them with the tools of citizenship, tools in the form of attitudes and techniques acquired as self-governing students in high school and college, then whom shall we blame when they accept

the blandishments of the siren totalitarianism? There are too many authoritarian methods in our schools even yet.

Now as engineering specialists, you may ask what the Hoover Report has to say about the area in which you are professionally interested. It is right and proper that each of us should give primary attention to the subjects with which we are particularly concerned. I must confess that I myself have not read the entire two million works of the Hoover Report—though I have examined carefully the majority and minority findings, plus the Task Force analyses, in the area of medical services and other subjects which particularly touch my own interests.

On the matter of engineering, the Hoover Report made extensive recommendations to which I can refer only briefly here. Perhaps the most important involved the overlapping and often conflicting activities of the Army Corps of Engineers and the Bureau of Reclamation. Former Governor Miller of Wyoming, has called these agencies "the lobby that can't be licked"—and a member of Congress from the State of Washington recently observed that the crucial test of the Hoover Report's effectiveness would come in precisely this area, for there are solidly entrenched interests in both of these agencies which constantly resist any proposal to change the present structure. Yet it is a matter of record that to prevent the flooding of Cherry Creek, a small stream near Denver, the Army Engineers tore down a dam which local engineers considered adequate, then built another three miles long, 140 feet high and costing 15 million dollars. It is also a matter of record that the Army Engineers and the Reclamation Bureau drew up separate plans for a project at Hell's Canyon, Idaho; each set of plans cost about $250,000, yet they differed in essential particulars of construction and differed, also, by over 75 million dollars in cost of erection.

In the light of these findings, the Hoover Report recommended that the Department of the Interior should be given clear major responsibility for government development of the nation's water and mineral resources; and that, since these activities require large public works, other major public works should also be managed by the department. To these ends, the report observed, the Interior Department should take over the flood-control and rivers and harbors work of the Army Engineers, plus other responsibilities now vested in several different agencies. The Hoover Commission, may I remind you, was not concerned with governmental policies nor with political ideas. It did not say, for example, whether there should be a large-scale Federal system of Social Security; it merely said that *if* the American people, through their representatives in Congress, decide that Social Security is a proper function of the Federal Government, there is an efficient way to organize and administer such a program.

Here, then, is the essence of my message for you today: As engineers, study the Hoover Report as it applies to engineering problems; and go on from there. As citizens, concern yourselves with all proposals for improving the efficiency of our government, to the end that we may withstand the buffets of more highly organized but fundamentally less sound governmental systems. As educators, accept your responsibility to open the eyes of the students, make them aware of their civic opportunities and their civic duties, encourage in them the questioning attitude, the non-acceptance of authority simply because it is authority.

For if we educators do our work well, there is yet hope that the greatest system of government yet devised by man—the democratic system—shall prevail and extend its influence wherever on this planet men want to claim their inalienable right to be men.

Development of the Teacher of Engineering

EDITOR: *A symposium on the development of engineering teachers was held at a meeting of the Illinois-Indiana Section at Purdue University, May 20, 1950. The following are statements prepared by those participating in the conference.*

Introduction

By A. A. POTTER

Dean of Engineering, Purdue University

That the engineering teacher is recognized, appreciated, and even honored by the engineering profession is evidenced by the fact that so many teachers have served and are serving as officers and on the governing boards of the major engineering societies. The ASME, since its foundation in 1880, has had out of a total of 68 presidents 13 who were teachers of engineering. The Lamme Medal and Westinghouse Awards for excellence in teaching and for the improvement of teaching are evidences of the interest of American industry in encouraging the engineering teacher. Of the 26 recipients of the Washington Award for conscientious service of engineers in the public interest, sponsored by the major professional engineering societies, six were teachers.

How teachers can be better prepared was the subject of a conference held in Chicago on December 8–10, 1949, under the joint sponsorship of the American Council on Education and the U. S. Office of Education. At this conference it was brought out that teachers must have attractive personalities, insight, sensitiveness, and perspective—they must be persons who have moral strength, a happy disposition, and a sense of humor, and who have an urge to be guides, philosophers, and friends of students, people who are scholars and who live up to high ethical standards. Above all, humanity is the distinguishing characteristic of a great teacher, who understands and loves his students as he understands and loves the subject he teaches—a person who has a quenchless desire to instruct, inspire, and aid his students.

Engineering colleges have in the past looked upon undergraduate instruction as their main function, and good teaching as a major responsibility. As research and graduate study in engineering grows, there has developed a fear in some quarters that a changed attitude with reference to good teaching may result; that is, there is a feeling on the part of many that pressure for graduate enrollment and for more research activity and publications may result in a condition now quite common in many of our university departments, where the teaching of undergraduates is left largely to unimaginative and unproductive older staff members or to graduate students.

The Philosophy of Engineering Education as it Applies to the Development of Teachers

By W. L. EVERITT

Dean of Engineering, University of Illinois

In all discussions on engineering education it is customary to state that we must stress fundamentals, that we must teach our students to think and that we must develop more than the technical side of the student. These are well accepted axioms but the real questions which need discussion are what *are* fundamentals, how can we create in the student confidence in his ability to learn, and what are the mechanisms for developing the broadened individual. Some people define fundamentals as those things they individually know best. Others consider fundamentals as merely those topics which come first in the logical development of a subject. We must go behind these simple concepts for a real insight into the matter and I can only approach it sketchily today.

The basic problem of all education is to teach the student how to make good decisions. You note that I say good and not correct decisions, because in most problems which are met in life there is not a unique answer and the information which is obtainable cannot be used to determine that one course is right and all others are wrong.

We should recognize that the education of an engineer or of any other professional man is a lifetime process; therefore, this problem of education is one of teamwork between the school, industry, and the individual. In our crowded curriculum the school must teach what it can do best and industry must be left to do what it can do best. This means that the university cannot devote much time to current practice, to how things are done in industry, but must lay a foundation on which the individual will continue to build throughout his career. It is obviously impossible to teach all that should be known and, therefore, alumni should not continue to request us to add to the curriculum specialized knowledge, just because they have found it useful, and which they think should have been taught to them in school.

Development of Teacher's Interest is Also Important

In considering the educational process we should recognize that the student is more important than the teacher, and the teacher is more important than the curriculum. In the ASEE and in other educational councils we have spent a great deal of time in discussing the curriculum, because that is something which can be analyzed on paper and upon which definite conclusions can be reached. We have considered the curriculum primarily from the standpoint of what the student should know. We have not given it much thought from the standpoint of the development of the teacher, which may in the end be even more important for a maximum benefit for the student. I am delighted that this year the emphasis of the ASEE has been placed upon the development of the teacher. I believe that this requires more than a one-year effort and should be continued. I hope that in the future we shall spend more time discussing problems of teaching as contrasted with details of subject matter. It is true that if we have good students even poor teachers may not hurt them too much, but unless we do provide mental development through contact with good teachers, universities can hardly justify their existence. A stimulating teacher can develop in the student the ability to tackle any subject, no matter how complex. This can be done through the medium of a wide variety of subject matter. On the

other hand, a poor teacher can make the most important subject uninspiring. Furthermore, the best rounded education can be produced by having teachers of all subjects who are themselves cultured and broadminded.

In discussing curricula a great deal of stress has been laid, in recent years, upon eliminating specialization at the undergraduate level. In much of this discussion the word "specialization" has been misused frequently almost to the same extent as the word Communism in political thought. If we consider our curriculum for the moment from the standpoint of the development of teachers, who in turn can do the best job for the student, I think it is undesirable to try and put students through a common mold, even in a given branch of engineering. It is necessary in a university to present a wide variety of subject matter in order to give the teachers an opportunity to develop and to make them feel that original ideas are worthwhile and acceptable. Before 1930 many electrical engineering curricula followed a common pattern in the mistaken belief that the fundamentals constituted those subjects which had always been accepted as the backbone of an electrical engineering curriculum. Those of us who were interested in developing the field of electronics were accused of specializing our students, although it is now accepted that the analysis of circuits involving the motion of electrons in space is as fundamental as an analysis involving only motion in wires. If a few schools had not allowed us to develop these areas through Communication options and elective courses, our own development would have been thwarted and a broader idea of what fundamentals are would not have been developed. It is difficult for a teacher to grow unless he is exploring new areas, and he will lack stimulus unless he is permitted in turn to convey his new found knowledge to his students. Furthermore, a certain amount of specialization is necessary in order to teach students how to solve harder problems requiring more background and integrating a number of fundamentals. It is broadness in thought rather than in subject matter that is the ultimate aim of many who are accused of introducing specialization in their teaching.

For fear I may be misinterpreted, I want to state plainly that I am still in favor of a broad base in social and humanistic subjects and in the basic sciences. In providing some electives or options in a technical curriculum we also open a stimulating area of competition between teachers. If the students are free to choose among several areas they show surprising good sense in going to the best teachers, and engineers certainly do not choose the easiest taskmasters. If the teaching in one area becomes dull or stodgy you will find a tendency for the students to elect an alternative option or course. This in turn will put the original group on their mettle to improve their teaching. Therefore I want to support the ideas of alternative programs not only in the division which occurs at the end of the freshman year, but also in the division that may be offered in a given branch of engineering in the junior or senior year.

The Scientist and the Engineer

In recent years there has been much confusion between the terms "scientist" and "engineer." If a distinction can be made I would say that the function of the scientist is primarily one of analysis. He seeks to know if a certain state of conditions exist, what would follow, what are the natural consequences. The primary problem of the engineer, on the other hand, is one of synthesis; he wishes to find out what conditions must be assembled in order to make a desired result follow. This means that the engineer must integrate from the world of knowledge all of the methods of attack which may be brought to bear on the problem. Synthesis is necessarily an art; it depends upon ingenuity and to a certain extent upon experience. The engineer must continually meet new situations. In fact, an en-

gineering education should unfit a man to do repetitive tasks. He must learn how to analyze a *problem* rather than confine himself to the straightforward relations of cause and effect. He must develop judgment. We recognize that all of this is not teachable at the college level; only a beginning can be made before the student is turned over to industry.

All of this indicates that one of the fundamental problems in engineering education is how to develop the ability to transfer ideas learned from the solution of one set of problems to an attack on a totally new set of problems. Psychologists insist that there is relatively little transfer of learning from one area to another. Rather than accept this conclusion on the basis of the teaching methods which they have studied, I think that a new area of research in teaching is indicated. This research should try to ascertain what are the principles which can develop an ability to make a transfer of learning. Such an ability is absolutely essential to the engineer. We have all observed individuals who have this ability to a high degree. We firmly believe that engineering education has in the past developed it to a definite extent. Undoubtedly improvement can be made in this area if we really understand the principles involved. I hope that psychologists and engineers can work together in the future in this important area of education.

The Part of Formal Courses in Education

By B. L. DOBBS

Director, Division of Education and Applied Psychology, Purdue University

It has been suggested that I discuss the part that formal courses dealing with the history and philosophy of education, the learning process, and teaching methods may play in the education of the engineering teacher. I am quite aware of the reservations that many people have concerning the effectiveness of any course which proposes to teach other people how to teach. There are some limitations which I think any of us who work in the field of education would freely recognize. Certainly the good teacher must have some concern for the individuals with whom he deals in the classroom and the conviction that what he teaches is important. This initial point of view, I believe, is fundamental. Also, it is certainly true that no individual becomes a good teacher except by the actual experience of teaching. However, it is reasonable to assume that if this experience in actual teaching is preceded or paralleled by some analysis and study of the principles and procedures involved that this experience in teaching can actually be much more profitable, and progress in the development of greater competence and skill be much more rapid. Good teachers, through experience, probably do learn the fundamental principles involved in the direction of the learning of other people, but this can be something of a trial and error and lengthy process. What may be gained by formal courses in Education is some ability to profit and develop through experience much more rapidly than would otherwise be possible.

There has developed a considerable body of observed experience and research in the social fields which deal with the problems of learning and human behavior. Granted that research in these fields is always complicated by the problems of controlling all but the experimental variable, nevertheless, there are some generally recognized principles which need to be understood if the teacher is to have any real insight into the teaching and learning process. Perhaps a few simple ex-

amples are appropriate to illustrate this point. For instance, an elementary but fundamental fact is that teaching is never anything but the direction of the learning of others. Students do not learn through the activity of the teacher by process of a passive absorption. Rather what the teacher can do and only can do is to set up situations in which the student is guided into some mental or physical activity of his own. Yet much teaching by inference ignores this fact.

The importance of considering and determining in a definite manner the objectives of a course is frequently not recognized by the beginning teacher; yet there are different types of objectives which call for very different kinds of learning activities in the classroom. For example, the mastery of a particular motor skill or the mastery of a given body of facts through memorization both call for some systematic type of drill activity and there are certain principles regarding the distribution of practice and review in order to secure retention and delayed recall. However, if the objective of the course is to develop the ability to solve problems and to do reflective thinking, drill procedure which is appropriate for the development of the more or less automatic skills will be largely ineffective.

One of the problems that faces every teacher is the problem of testing, evaluation, or measurement of the outcomes of instruction. There probably has been more systematic study of this aspect of the instructional program than of any other aspect. Many beginning teachers are quite unsophisticated about the procedures of measurement. Granted, that there are limitations to most types of measurements, there are a variety of devices which the beginning teachers should understand. Attaining a healthy distrust of some of the conventional means of testing is, in my judgment, not at all undesirable.

Personally, I have some degree of doubt of the extent to which a formal course in education can specify precise classroom procedures. These need to be adapted to the individual personality of the teacher and the type of teaching outcome desired. However, consideration of different types of classroom procedures can help broaden the beginning teacher's knowledge of available methods. Aid can be given in developing an understanding of the various types of audio-visual aids which may be used.

While I believe that the average beginning teacher is likely to be primarily concerned with the actual problems of instruction which he meets in the classroom and that this is the heart of any education program, I personally have a conviction that the good teacher must have, as well, a broad understanding of the role of education in our society, of the role of the professional school in our educational program, and some understanding of the organization and operation of the university in which he works. Therefore, while this may seem theoretical to the practical mind, I think it is very important that the teacher does develop a philosophy of education and the ability to see the part of his particular teaching field in the development of the individual and to understand the purposes of the university system of which he is a part. I know that the work which Dean Potter has done in his seminar on engineering education, which is the outgrowth of the philosophy and broad experience of a great teacher, can provide a fundamental orientation and stimulation to the beginning teacher. I would certainly hope that any work in formal courses in education would draw upon the resources of experience of staff in all department of the university and that any program of education of the prospective college teacher would have some time to deal with these broad problems of university and professional education.

These are obviously some very sketchy remarks. I do have a conviction that courses, which can be developed along with experience in teaching situations, can be useful in the development of teachers.

Interneship for Engineering Teachers

By F. L. WILKINSON, JR.

President, Rose Polytechnic Institute

I entered the teaching profession from industry approximately seventeen years ago, wholly unprepared for what I was to experience and completely aware of my inadequacy for the task. I approached my dean, a gentleman of over forty years' experience in teaching engineering, and asked for advice on "how to teach." I recall with what earnestness he said: "I do not know how to advise you. I think perhaps you would do well to look back over your college career and pick out the one among your instructors who inspired you the most, and emulate him," and he went on to say that he believed I should find that he was probably not one who had the greatest reputation as a scientist or engineer, but the one who stimulated my intellectual curiosity more than any other.

While I fully appreciate that I have never succeeded in my efforts at emulation, that advice has always been with me, and I soon came to the realization that I had not chosen one man to follow, but that in that first year I had built up a preceptor who was a synthesis of the good qualities of several under whom it had been my good fortune to sit as a student and as a practicing engineer. While I have never succeeded in my ambitions to become an outstanding teacher, this practice of evaluation and emulation I consider to be an excellent technique for one entering the teaching profession after a number of years of separation from the classroom.

We recruit our engineering teachers today from young men who have not had the advantage of a number of years in which to evaluate fully the effectiveness of those who taught them. They pass, for the most part, without pause from the role of student to that of teacher. The industrial employer would not think of giving to the recent graduate the responsibilities we in the engineering colleges have thrust upon him without a period of interneship or training in these responsibilities. Of course, the department heads and the senior professors are always at hand to assist in the evaluation of the tests and examinations he gives, in advice as to the degree of perfection to which he must hold his students, but all too frequently he faces his classes wholly unprepared for what he will meet in the classroom and laboratory.

As an administrator, constantly worried about financing the educational program of a small college, I am aware of the fact that what I have to propose for a solution of our dilemma is a drain on teaching budgets. It is, however, the development of a plan that we at Rose have undertaken as the result of experiences gained in the years immediately following the war when, like all of you, the administration was faced with the problem of meeting the temporary teaching demands of a swollen student body. Selected young men, recently graduated from our own institution and from others, with only the bachelor's degree, were employed as instructors. These young men were placed under the guidance of older members of the faculty, sat in their classes and observed the techniques of these men of greater experience, and concurrently taught sections in many of the courses they attended as observers. Employment was on a term to term basis and the turn-over was unusually high. On the other hand, there were a few whose interest in teaching became pronounced and whose abilities marked them as excellent prospects for the teaching profession. These were retained and they were gradually given greater responsibilities.

As the teaching loads in the various

departments fell off with the reduced enrollments, all but five of these young men were placed advantageously in industrial employment and the others continued as full-time instructors on the faculty.

Graduate Fellowship Plan

We recognize that their engineering education is incomplete, that a period of advanced study is now in order. The Institute, therefore, adopted a policy of providing graduate fellowships at other institutions for those whom we hope to retain. Two of these are pursuing advanced degrees under this plan at the present time. At least one will start his graduate work in September 1950, and the program will continue until all of those whom we hope to retain have received a minimum of a master's degree in engineering under a fellowship provided by the Institute.

While this plan developed under necessity, it has appealed to me from the aspects of interneship or practice teaching. It has been interesting to see that each of these young men has developed excellent teaching abilities through observation before fully completing his technical education. I believe that because there was a certain doubt of the thoroughness of their education on the part of the senior members of the faculty, they have received more attention from their seniors than if they had come to faculty fresh from graduate school. I firmly believe that upon their return to the faculty they will be even better teachers for, while they complete their technical education, they will be ever alert to evaluation of good teaching from those they sit under in graduate school.

Just as I am convinced that graduate school is of greater benefit to the practicing engineer if he has experienced several years of practice between his undergraduate and graduate years, I believe that better teachers of engineering will be developed through graduate work following teaching interneship. The important part of the program is the period immediately following his undergraduate years and the effort expended by the senior members of each department concerned in the period of interneship. In other words, good teachers must take as much interest in the interne as in the students they teach. I believe that the period of observation should be with the undergraduate teacher and not in graduate classes. If the period of observation is spent in the graduate classroom, the interne becomes a subject matter student and not a teaching observer.

Thus experience, born of necessity, leads me to believe that good teachers of engineering may be developed through teaching interneships between undergraduate and graduate years.

Orientation of Engineering Teachers

By J. T. RETTALIATA

Dean of Engineering, Illinois Institute of Technology

Many organizations devote considerable attention to the orientation of new members becoming associated with them. From experience it has been learned that properly acclimating and preparing the newcomer for the duties he is to perform is a sound procedure that pays dividends and promotes good public relations. Progressive industrial concerns have formal orientation training programs for graduate engineers entering their employ. Such programs acquaint the employe with some of the specialization peculiar to the particular company concerned; as it is recognized that sound engineering curricula are not intended to accomplish this end.

Educational institutions have not fol-

lowed the lead of industry and consequently, as a general practice, do not have in operation orientation procedures for teachers. In the opinion of many, such omission is not because the need is nonexistent as classroom instruction could undoubtedly be improved in many respects. The formal undergraduate and graduate education of the prospective engineering teacher contains little to make him adept in future pedagogical pursuits. In fact, there are some who claim that emphasis on research has an aggravating influence on the attainment of good teachers. The graduate engineer entering industry probably can apply his college work as directly to his job as can the engineering teacher, yet industry has seen the necessity for introducing orientation programs. It is reasonable to expect that they could also serve a useful purpose in academic institutions.

In the educationally critical period immediately following World War II, when teachers were difficult to obtain but students were not, in order to accommodate the increased enrollment it was necessary to resort to some practices which did not produce optimum teaching results. In some instances a larger than desirable portion of graduate students was used for classroom instruction, and also there was a tendency to retain staff members beyond retirement age. Even though the cause for this situation is passing, some faculty members believe the condition is being perpetuated by, in their opinion, an excessive accentuation of publications and research at the expense of recognition of the good undergraduate teacher.

It is probably significant that faculty rating by the students increased in popularity in the post-war period and, while many question the competence of the student to comment on teaching methods, such ratings will conceivably be used to a greater extent in the future. In order to minimize the need for this sort of student appraisal, improved teaching accomplished through orientation programs would be worthwhile.

Characteristics of Good Teachers

It is commonly accepted that one of the most desirable qualifications of a teacher is a thorough knowledge of the subject matter. All too frequently there is the implication that such knowledge infers the guarantee of a good teacher. Refutations of this, however, are sufficiently numerous to establish the premise that mere possession of understanding is not automatically accompanied by the ability to impart it to others. It is this transmission of the understanding of the subject matter from teacher to student that must be accomplished. A good teacher possesses a high "transmission efficiency" in addition to mastery of his subject. As far as the student is concerned, the teacher's intellectual command of his field may be nullified by poor transmission tactics. The product of both factors should be high in order to accomplish the desired result.

The principal intent of an orientation program would be to develop the transmission factor in all of its aspects, as it will be assumed that the candidate has previously given evidence of his having an adequate knowledge of the field in which he is engaged. Occasionally one sees listed the desirable attributes of a good teacher. Such enumerations usually include so many virtues that it is questionable whether a single individual possesses a large combination of them. Since many of these characteristics depend upon the basic nature of the individual it would not appear that an orientation program should embrace development of such items to any large degree, but rather be aimed at improving pedagogical skills as its primary objective.

Importance of Orientation Programs

To be successful it is believed that an orientation program should be conducted on a scheduled basis, meeting regularly throughout the academic year. At the writer's institution such a program was arranged with weekly meetings. At each session the speaker was a staff member recognized as an authority in the par-

ticular subject under discussion at the time. Best results can be obtained if the meetings are conducted in round-table fashion so that adequate opportunity for discussion can exist.

Since the orientation program is intended to acquaint the inexperienced teacher with the principles of effective teaching, the topics to be covered should include background material as well as instructional techniques. A logical introduction would explain the preparation of departmental curricula, courses, course outlines, and individual lesson plans, emphasizing the educational objectives to be attained.

The proper procedure for conducting a class session could next be considered. The presentation should include means for arousing student interest by explaining the purpose of the course, how it is integrated into the complete program, and its possible application in future jobs. The importance of a good personal appearance should be stressed. The instructor should give evidence of being self-confident and in command of the classroom situation. Such command is best achieved by thorough knowledge of the subject so as to eliminate the necessity of evasiveness or bluffing when replying to questions from students. Annoying mannerisms of person or speech involving disturbing gestures should be controlled.

Familiarity with the salient features of accepted public speaking procedures would benefit the new instructor. Sincerity and enthusiasm will animate the presentation and promote interest on the part of the student. Formal lecturing is not necessary and in the majority of cases probably undesirable. Rather a better method would involve participation by the student, as such direct association with the class session encourages more active interest.

The application of principles learned in the lecture course can best be made in the laboratory. The new instructor should recognize the basic importance of laboratory courses and strive to conduct them in a manner conducive to the attainment of desired results. Some students understand theory only when they see it demonstrated in the laboratory. Many students enter the laboratory without adequate preparation so a good plan would be for the instructor to brief the students regarding the purpose of the experiment to be performed, so that it can be conducted more intelligently and correct conclusions obtained. Laboratory groups should not be too large if participation of all students is to be realized. The students should know that well-prepared laboratory reports, although not necessarily lengthy ones, with sound conclusions are expected. An examination in the laboratory course is desirable to determine individual student performance. It is the responsibility of the instructor to see to it that proper safety precautions are adhered to by the students in the laboratory. For best coordination the same instructor should teach both the lecture and laboratory courses in a given subject.

Better Use of Instructional Aids

The new teacher should be informed of the proper use of instructional aids. It should be emphasized that such aids are for the purpose of enhancing the teaching process and are not intended as a substitute for the instructor. Consequently, he should not regard them as a means of reducing the expenditure of effort on his part. On the contrary the proper use of such aids requires intelligent preparation in order to accomplish worthwhile results. The majority of instructional aids are visual, and the most common and useful one is the blackboard. Notwithstanding its many years of existence, the blackboard is still misused by many teachers. Some instructors retain a fondness for directing their remarks to it instead of to the students, and some have a tendency to conceal what they have written by interposing themselves between the students and the part of the board being used. These are common and obvious failings, but the new instructor must be made cognizant of them so as to be on the alert and not lapse into such

practices. At all times, extraneous material not pertinent to the subject under discussion should be erased so as to avoid distraction on the part of the students.

Textbooks, notes, instructions, etc., may also be considered as instructional aids and knowledge of their proper use should be acquired. Other aids would include models, charts, lantern slides, and motion pictures. Each has its place and when used correctly much benefit can result by the additional clarification which would otherwise be difficult to obtain. It should also be remembered that successful demonstrations with instructional aids are not automatic and adequate prior preparation on the part of the instructor is essential.

It is important that the inexperienced teacher learn the proper manner in which to measure the progress of the student. The usual device is the written test. Occasionally the young instructor believes that the adoption of a tough attitude impresses the students with his brilliance and mastery of the subject. In executing this belief he has a tendency to give difficult and unreasonable tests. This may establish his position of authority to his satisfaction, but such procedure is not in keeping with the intended philosophy of constructive measurement. It should be pointed out that tests not only establish a grade in the course, but also are a means of emphasizing the important and essential parts of a course. The results of a test furnish information to both instructor and student. The latter learns of the areas wherein he may be weak, and the instructor whether his methods are effective as evidenced by the performance of the class as a whole. Much thought should be devoted to the preparation of tests to assure their being representative of the material covered in class. Tests should be graded and returned promptly so that the student knows of his performance without delay.

Progress may also be observed by having the students go to the blackboard during the class session. Such participation, involving the direct application of principles while under supervision, is an excellent means of assuring the instructor that the student is not merely taking notes throughout the semester without appreciating their significance through utilization.

In making homework assignments the new instructor should appreciate that the outside time of the student is limited and must also be used in preparation of other courses. Consequently, such assignments should not require an unreasonable amount of time. Some determination of progress can be obtained by having the students explain the homework problems at the blackboard, although such a presentation may not necessarily be the result of independent effort.

Role of the Administration

Attending all of the sessions where the above items are discussed is only a partial step in the proper orientation of the new instructor. He must diligently put into practice the principles learned. If possible he should work under an experienced teacher and observe the application of correct procedures in actual operation. The department head should offer continual counsel and guidance while the newcomer is acquiring experience.

It should be recognized that the college administration has a definite responsibility in the attainment of a successful orientation program. Teaching loads should not be excessive if the new teacher is to have sufficient time to devote to his improvement. Class sizes should not be too large. Adequate facilities, space and equipment should be provided. Student graders should be made available to relieve the instructor of routine homework grading.

Obviously, the foregoing brief remarks are not intended as an exhaustive treatment of the matter of an orientation program for engineering teachers. Most of the suggestions presented are not novel, but rather have long been recognized as desirable practices for teachers to follow. Undoubtedly there is room for improvement in engineering teaching, and it is believed much progress can be accomplished through well-conducted orientation programs.

Lamme Award—1950—Fred B. Seely

FRED B. SEELY

To FRED B. SEELY *for his excellence as a teacher, his sympathetic understanding of his students, his clearness in presenting subject matter, both in class and by written text, his combination of research and teaching to make him a well balanced leader of his staff; for his contribution as a citizen of his community, his devotion to his profession, his contributions to technical societies to which he has devoted his energies; and for the high esteem in which he is held by his colleagues, we award this the twenty third Lamme Medal.*

FRED B. SEELY, the twenty-third Lamme medalist of the American Society for Engineering Education, has made lasting contributions to the enrichment of engineering education through his stimulating teaching and research; through his writings that have added to the permanent literature of engineering; through his administrative leadership in developing the creative talents of the teaching staff; and through his understanding of the importance of the proper balance in the relationship between engineering education and the practice of engineering.

Professor Seely was born in Chester, New York, April 29, 1884. After graduation from Worcester Polytechnic Institute in 1907 with a B.S. degree in mechanical engineering, he spent a short time in industry. The urge, however, to explore and clarify ideas and concepts in engineering naturally led him into the field of university teaching and research. He joined the staff of the Department of Theoretical and Appied Mechanics, University of Illinois, in 1909, received the M.S. degree in 1915 and was appointed to a full professorship in 1921. He became head of the department in 1934—the position he still holds.

Parallel with his teaching he carried on research in materials, mechanics of materials and hydraulics, and published numerous technical papers. A considerable number of these papers were the outgrowth of research carried on in close cooperation with students; and the research projects were started primarily as a means of developing the student.

His strong interest in effective teaching also led him to the writing of textbooks. He entered his life work at a time when the topics of mechanics and materials had burst the bonds of the earlier formalism and there had already appeared a broader perspective of the subject of mechanics involving an engineering as well as a scientific or theoretical viewpoint. This emerging scientific-engineering way of thinking permeated his textbooks: "Analytical Mechanics for Engineers" (with N. E. Ensign). "Resistance of Materials" and "Advanced Mechanics of Materials." These books were superior in character; they coordinated and integrated the subject matter into that unified whole which was needed especially by the beginning engineer. The significant effect which they have exerted on engineering education for the past quarter of a century is evidenced by the American Society of Mechanical Engineers' award to him in 1949 of the Worcester Reed Warner Medal for his "outstanding contribution to permanent engineering literature."

Through his enthusiasm and administrative leadership as Head of the Department of Theoretical and Applied Mechanics he has been very successful in promoting an educational program for developing the creative talents of the teaching staff. He has done much to establish faith in the dictum that one effective way to develop the alert teacher needed for instruction on the University level for both undergraduate and graduate instruction is for the instructor to combine teaching and research in such a way that each is made better by the other.

As chairman, for a score of years, of a committee on Engineering College Policy and Development he exerted a wholesome influence on engineering educational policies at the University of Illinois, by urging re-examination of methods and objectives and by encouraging reasonable

experimentation aimed at the improvement of classroom and laboratory instruction.

His breadth of interest and active mind carried him beyond the academic atmosphere of the classroom and laboratory. Always interested in community affairs he has served in various capacities; as a city alderman; as Vice President of a Savings and Loan Association and as a member of several civic boards. He is an active member of the American Society of Mechanical Engineers, the American Society for Testing Materials, the American Society for Engineering Education, of which he was a member of the Council in 1937–40, and the Engineers Club of Chicago. He is also a member of the honorary scholastic societies of Tau Beta Pi, Sigma Xi, and Phi Kappa Phi.

College Notes

The appointment of Ashley S. Campbell, of the Division of Engineering Sciences, Harvard University, as Dean of the College of Technology at the **University of Maine**, was announced by Dr. Arthur A. Hauck, president of the university. Dr. Campbell succeeds Dean Paul Cloke who retired in June after serving 24 years as head of the college. Dr. Campbell was an instructor in the Harvard Graduate School of Engineering in 1947–48 and assistant dean of the school in 1948–49. Since that time he has been assistant professor of engineering science with primary responsibility for developing the Harvard laboratory in mechanical engineering. Dean Cloke has devoted almost a quarter of a century to his work at the University of Maine, and has worked devotedly and effectively in carrying forward the high standards of the College of Technology.

John Ray Dunning, professor of Physics, scientific director of Columbia's new cyclotron, and a pioneer in atomic research, has been appointed dean of the School of Engineering at **Columbia University**. Dr. Dunning succeeds Dean James K. Finch, who will retire June 30.

Robert Edward Stiemke, professor of sanitary engineering at the Pennsylvania State College, has been appointed director of the School of Civil Engineering at the **Georgia Institute of Technology.**

A cooperative program enabling engineering students to obtain a broad general education before concentrating on a chosen special field of science or technology has been effected by **Rensselaer Polytechnic Institute** and **Franklin and Marshall College.** The agreement is similar to those Rensselaer has made recently with three other centers of the liberal arts—Washington and Lee University, Trinity College and St. Lawrence University. Under the plan students may elect to complete three years of the regular liberal arts program at Franklin and Marshall, with emphasis on the basic sciences and mathematics, before entering on two years of specialized study in one of Rensselaer's major departments.

George Westinghouse Award—1950—
Rolf Eliassen

To ROLF ELIASSEN *for outstanding and devoted teaching in Sanitary Engineering; for warm and friendly guidance of his students, characterized by a deep personal interest in their careers; for unusual laboratory development and other visual aids to better teaching; for stimulating short courses for practicing engineers and technicians; and for many research contributions of a high order, this fifth George Westinghouse Award is granted.*

The fifth recipient of the George Westinghouse Award has achieved national renown for his distinguished contributions as an engineering consultant to the government, as an inspiring and enthusiastic teacher, and as director of the Sanitary Engineering Program in one of America's foremost engineering colleges.

Rolf Eliassen, Professor of Sanitary Engineering in the Department of Civil and Sanitary Engineering at the Massachusetts Institute of Technology, was born in Brooklyn, New York, on February 22, 1911. He is a graduate of M.I.T. in the class of 1932, where he received a B.S. degree in civil and sanitary engineering. He holds M.S. and Sc.D. degrees from the Institute, granted in 1933 and 1935, respectively.

Following the completion of his education at M.I.T., Dr. Eliassen served with two consulting engineering firms before going to the Illinois Institute of Technology as Assistant Professor of Sanitary Engineering in 1939. One year later he became Associate Professor of Sanitary Engineering and Director of the Sanitary Engineering Research Laboratory of New York University, to which post he returned as full Professor in 1946.

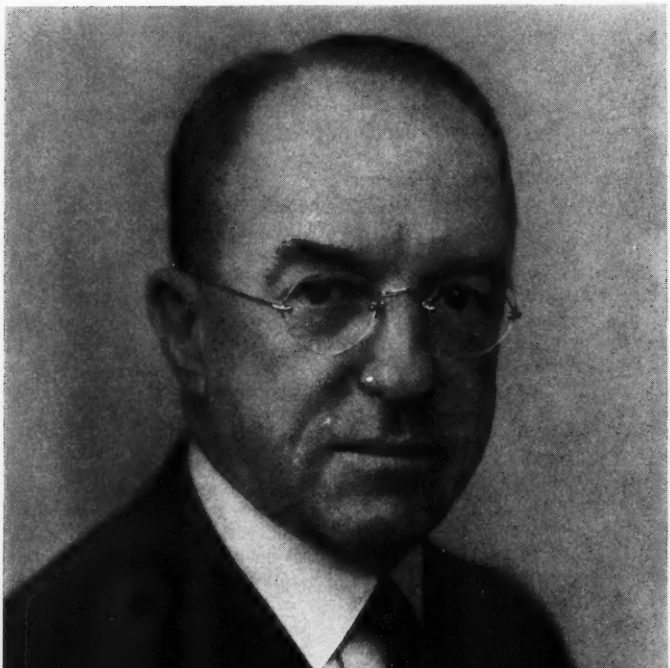
At New York University, Professor Eliassen was in charge of the teaching and research program in sanitary and public health engineering with special emphasis on the purification of water and sewage From 1940–42 he served as consultant to the National Resources Planning Board on the quantity and quality of water available for defense industries in the middle Atlantic states; in the summer of 1941, in association with Parsons, Klapp, Brinckerhoff and Douglas, Dr. Eliassen supervised the design of water and sewage systems for Army posts in the Caribbean Defense Command.

During World War II, Dr. Eliassen was in charge of the sanitary engineering division of the Second and later of the Ninth Service Commands, as Captain, Major, and Lieutenant Colonel in the Corps of Engineers. For four months he was assigned to the Biarritz American University at Biarritz, France, as head of the Department of Civil Engineering.

At M.I.T. since 1949, Professor Eliassen has been in charge of an expanding research program in water purification and waste disposal problems. As director of the Institute's sanitary engineering curriculum, Professor Eliassen is in charge of the graduate course as well as extensive undergraduate work in the field given within the civil engineering course.

Widely known for consulting work and publications in the field of sanitary engineering, Dr. Eliassen is a member of the American Water Works Association, the American Public Health Association, and the American Society of Civil Engineers. From 1946 to 1948, he served as Chairman of the ASCE Committee on Refuse Collection and Disposal, and in 1949 as Chairman of the Committee on Corrosion Control.

James H. McGraw Award—1950—
Harry Parker Hammond



To HARRY PARKER HAMMOND *for his outstanding contributions to technical institute education; for his stimulating leadership in the development of technical institute training facilities, particularly in the State of Pennsylvania; for his tireless efforts in establishing a nationally recognized technical institute accrediting agency under the auspices of the Engineers' Council for Professional Development; for his many articles and public appearances on the subject of technical institute education; for his keen analyses of the relationships between engineering education, the engineering profession, and technical institute training; for his guiding influence in the growth and development of the Technical Institute Division of the American Society for Engineering Education.*

Harry Parker Hammond, Dean of the School of Engineering, The Pennsylvania State College, received the degree of Bachelor of Science in Civil Engineering in 1909 from the University of Pennsylvania. In 1915 he received the degree of Civil Engineer from the same institution. The honorary degree of Doctor of Engineering was awarded Dean Hammond in 1931 by the Case School of Applied Science, and in 1943 the University of Vermont made him a Doctor of Laws.

He served as an instructor in civil engineering during two years at the University of Pennsylvania and during one year at Lehigh University. In 1912, he became Assistant Professor of Civil Engineering at the Polytechnic Institute of Brooklyn, was appointed Professor of Civil Engineering and Head of the Department in 1927, and remained in that position until 1937 when he was appointed Dean of the School of Engineering of The Pennsylvania State College. Under Dean Hammond's leadership at Pennsylvania State College, there has developed through the Extension Division a broad and effective program of technical education, including the establishment of seven day and ten evening technical institutes.

Dean Hammond's great interest in engineering education and his influence upon it have been manifested most directly by the exceptional contributions he has made to the American Society for Engineering Education over a period of twenty-five years. He served that Society as Vice President in 1934–35 and as President in 1936–37. He served as chairman of some of its most important committees, was a member of the Council from 1927 to 1930, and was an ex-officio member of the Council as Past President. In 1945, Dean Hammond received the Lamme Award, generally recognized as the most distinguished mark in engineering education.

In 1943, Dean Hammond accepted the chairmanship of a special ECPD committee created to study the technical institute accrediting problem. The report of his investigating group submitted to the Committee on Engineering Schools in April, 1944, led to the creating of an active accrediting committee to evaluate programs of technical institute type. Dean Hammond accepted the Chairmanship of this Committee and has provided active leadership in it since that time.

Throughout his years of service in these activities and offices he has been one of the few outstanding engineering educators who has fully recognized the relationship of technical institute instruction to professional engineering education. He has served as an influential technical institute spokesman among engineering educators principally concerned with college and university instruction. He has done much to give them an understanding of the place the graduate of the technical institute can fill in engineering and industry.

Report of the Engineering College Administrative Council

In November 1949, the Administrative Council, in cooperation with the Engineering College Research Council and the Land-Grant College Association, held a meeting on the subject "Atomic Energy Developments Present Engineering Education With New Problems." Five papers were presented at the meeting. Chairman Terman at the end of the meeting gave a most effective summary, and among other things pointed out that from the discussion it was evident: (1) atomic developments are going to affect civil, electrical, mechanical, chemical, and metallurgical engineers; (2) no engineers will be able to ignore atomic developments in the future; (3) it appears worthwhile to re-examine the fundamental physics training now required of all engineers to see whether it contains an adequate introduction to such matters as radio activity and atomic structure.

After several years of discussion and much planning this year, the ECAC is trying out the plan of holding one closed session open only to accredited engineering institutions and at which matters of primary concern to administrative officers will be discussed. In order to insure that each accredited institution would be represented, the Executive Committee instructed that a letter be written to presidents of member institutions asking that they officially designate a representative to this closed meeting. Some 143 institutions were thus notified.

At the March meeting of the Executive Committee, it was decided that the ECAC would make its "project of the year" an attempt to determine through a sampling procedure just what actually is happening to our college graduates from the point of view of employment. The need for such a survey is brought out by the fact that last year many more engineers found employment than had been predicted.

The plan is to enlist the cooperation of every engineering school in circularizing its 1950 engineering graduates with a questionnaire which would indicate the type of employment in which the graduate is employed. An anonymous questionnaire would be sent to one-half of all engineering graduates. In certain schools only, the other half of the students would be sent the same questionnaire and a careful follow-up would be made to be certain that all of these questionnaires had been received. The latter step would provide a means of interpreting the results of the survey as a whole.

The following is a list of new committee chairmen:

Manpower—G. D. Lobingier
Secondary Schools—W. S. Evans
Military Affairs—D. B. Prentice
Selection & Guidance—H. R. Beatty
International Relations—W. R. Woolrich

The following persons have been added to the Executive Committee:

J. H. Davis
T. Keith Glennan
J. F. Downie-Smith
H. E. Wessman

The Administrative Council is planning a meeting dealing with the general subject of emergency college educational programs, to be held at the conclusion of the Land-Grant College Association meeting in Washington, D. C., November 13–17, 1950.

Respectfully submitted,
F. E. TERMAN, *Vice President ASEE and Chairman ECAC*
J. H. LAMPE, *Secretary ECAC*

Report of the Engineering College Research Council, 1949-1950

It is our pleasure to present a new brochure, "Research is Learning," created as a definitive statement, with case-history examples, of the purposes of engineering research in our member institutions. "Research is Learning" emphasizes the position of research as a part of education in engineering schools. To widen the understanding of that position, and to increase the effectiveness of research as an educational tool, are the primary tasks of the Engineering College Research Council.

We are not a research management authority. While our purposes encompass discussion of research and patent administration from the point of view of efficiency and effectiveness, we must not forget—just as any individual research director must never forget—that administration is a means, not an end. We are not organized to promote research as a business for colleges and universities. Educational institutions must chart their courses with increasing care in order to avoid the hazards of competing with taxed, profit-making enterprises. Our aim is to attract that type of research which properly contributes to the educational environment—and to show that we can in reality work with commercial research organizations in the discharge of our responsibilities, not compete with them.

When the Engineering College Research Association, our predecessor organization, was formed, one of its goals was to represent *all* universities and so to spread the responsibilities and advantages of educational research to all engineering schools, large and small, throughout the country. Each member institution, irrespective of its size, enjoys equal participation in the Research Council. We are certain that it is important to have the advantages of active research work felt on every campus. Broad distribution of research insures a larger supply of well-trained engineers, and it helps to spread the burden of responsibility for fundamental studies so that no one institution need accept so much work that research becomes a responsibility threatening to overshadow the educational purpose.

The creation of the National Science Foundation this spring marked an event in behalf of which the Research Council and the entire Society have taken an active role since the end of World War II. The Foundation will go far to assure permanent interest in and support for the type of research which is of greatest value in educational institutions and which we are convinced is of fundamental value to the nation. Cooperation with the National Science Foundation should be a major responsibility of the Research Council.

The increasing urgency of the "cold war" may give us additional responsibilities in the months immediately ahead. In times of peace we in engineering schools are privileged to center our efforts exclusively on those researches which seem to best fulfill our purposes and goals. But, in the national interest, we may soon be obligated to undertake projects with very specific military purposes and, in consequence, the necessity of security restrictions. During World War II we learned the fallacy of devoting our full energies to work of this character, at the expense of fundamental research and education. Even in wartime, fundamental research and education must continue without secrecy restrictions.

It is fitting to summarize details of the Research Council's 1949–1950 fiscal year, and to review our financial position.

We concluded our largest publishing venture early in the year with distribution of 2000 copies—the full printing—of the 1949 *Review of Current Research and Directory of Member Institutions.* In addition to cash sales, which resulted in an income of more that $800, we invited member institutions to pass complimentary copies to those of their associates and sponsors concerned in engineering research, and our committees achieved a substantial distribution to government and industrial officials. Its enthusiastic reception by recipients and by reviewers in the engineering journals was most heartening.

A new Committee on Relations with Industrial Research Agencies has been set up during the course of the year, under the direction of Harold K. Work, Director of Engineering Research at New York University. Evidence of this Committee's activity is the session on "Industrial Research in the Pacific Northwest," at the 1950 Annual Meeting. Our other Committees, on Relations with Military and Federal (Non-Military) Research Agencies, have continued to serve us effectively.

The Research Council's fall program, in Kansas City, Missouri, October 28, 1949, was designed to be of special interest to smaller institutions. The short papers presented were collected into an inexpensive leaflet on "Research Policies and Pitfalls," which enjoyed such a wide acceptance that our supply was promptly exhausted. The meeting was reviewed prominently in several journals. Late in the winter we completed work on the largest *Proceedings* ever printed by the Research Council, covering the sessions at Rensselaer Polytechnic Institute.

One of the most promising developments of the year is growing out of a meeting of research directors in colleges in the Pacific Northwest. They have formed an informal organization which will probably become the first regional branch of the Research Council. The administrative details of this new type of activity are now being worked out by our Executive Committee.

Sales of ECRC publications have enabled us to maintain a surplus of income over expenditures throughout the year, despite the heavier-than-usual expenses of the 1949 *Proceedings.* But many of the costs of the publications we have sold this year were paid for out of last year's deficit. Our financial position does not encourage many new activities, even if they are carried out in the most economical fashion possible, and the question of how to make most effective use of our resources is a serious one before the Executive Committee.

In the Annual Election for new officers of the Research Council, our members have chosen the following:

Chairman (two years)—Dr. Gerald A. Rosselot, Director of the Engineering Experiment Station, Georgia Institute of Technology.

Vice-Chairman (two years)—Professor A. G. Conrad, Chairman of the Department of Electrical Engineering, Yale University.

Directors (three years)—Dr. Ralph A. Morgen, Director of the Engineering and Industrial Experiment Station, University of Florida; and Dr. Kurt F. Wendt, Associate Director of the Engineering Experiment Station, University of Wisconsin.

Director (one year, to fill the unexpired term of Dr. Rosselot)—Dr. Eric A. Walker, Director of the Ordnance Research Laboratory and Head of the Department of Electrical Engineering, The Pennsylvania State College.

F. M. DAWSON, *Vice President ASEE, and Chairman ECRC.*

Report of the Vice-President in Charge of General and Regional Activities

Regional Activities

Section and Branch Affiliations

The Upper New York Section has inquired about the possibility of certain Canadian schools affiliating with that Section. The Section Chairman was advised of previous correspondence with the Chairman of the Committee on Applied Science and Engineering Education of the National Conference of Canadian Universities, and it was suggested that the proposed affiliation be cleared with that Conference prior to official presentation to the ASEE General Council, which under the Constitution prescribes the territorial limits of Sections.

As this report is written, active steps are being taken looking to the establishment of Branches of ASEE at the University of Tennessee and at Texas A. & M. College.

Section Meetings

Information at hand indicates that of the 16 Sections of ASEE, 12 have had one meeting during the year, 1 has held two meetings, and 1 has held three (two of which were evening meetings). Nine of the 14 day meetings have had one-day programs, four have had two-day programs, and one program has covered three days. It is believed that every Section meeting has been attended by at least one national officer. Your Vice-President has attended four meetings.

Section programs have included such topics or program themes as Testing and Guidance, Industry-College Relationships, University Cooperation with Government, Career Opportunities in Government for Engineers and Scientists, Objectives in Engineering Education, Improvement of Engineering Teaching, Examinations and What They Measure, Speaking Techniques, in addition to group meetings by major curricula or by general subjects.

A few reports of Section and Branch meetings have been received but have not contained enough items of special significance to warrant the proposed clearing house bulletin. This subject will be on the agenda for the June meeting of the Committee on Sections.

Study of Functions of General Council

It was suggested last fall that the Sections and Branches study the functions and operations of the General Council, in an effort to find means for improving its general effectiveness and its service to the individual members. One Section has had a committee studying this matter during the year. The committee has submitted a report which suggests no changes in the operations of the General Council, but recommends several changes in Section procedures, which will be studied by the incoming Section officers.

Manual for Section Officers

An outline for the proposed Manual for Section Officers was approved by the Committee on Sections last October, and the Chairman of the Committee was authorized to appoint subcommittees to prepare various portions of the Manual. A considerable volume of material was collected from Section officers, and distributed to the subcommittee chairmen for study. As this report is written, all subcommittees have reported and a preliminary draft of the Manual has been sent to all members of the Committee on Sections for criticisms.

General Activities

General Society activities of your Vice-President during the year have included the following:

Engineering Enrollments and Degrees

Under the terms of its agreement with ASEE, the U. S. Office of Education gathered and tabulated data on engineering enrollments and degrees and turned over the tabulations to the Secretary of ASEE. Reports were received from all but one of the ECPD accredited institutions and from 39 institutions listed in the Office of Education directory but not accredited by ECPD.

The Office of Education on March 20 issued its Circular no. 266, "Engineering Enrollments and Degrees, 1949," by Messrs. Story and Armsby, which reported:

(a) Total enrollments and degrees at the bachelor's, master's and doctor's levels for all institutions, with the ECPD accredited ones starred, and
(b) Similar data for each curriculum, with ECPD accredited curricula starred.

This report does not duplicate the ASEE report, but makes available for the first time data which should be of considerable value and for which the Office of Education has had many calls.

Society Representation

At the request of President Saville, your Vice-President represented the Society at a conference held by the U. S. State Department on February 2 and 3, 1950, for a discussion of the problems incident to the possible development of President Truman's Point IV program. Reports were rendered to President Saville and to the Executive Board on this meeting, and liaison is being continued with the State Department as to possible contributions this Society can make to the Point IV program, when and if established.

At the suggestion of President Saville, your Vice-President represented the Society at the annual meeting of the National Committee for Traffic Safety, which was held in Washington on March 9, 1950.

Preliminary conversations were held with officials of the Atomic Energy Commission, leading up to the appointment by President Saville of a Steering Committee on Cooperation with the Atomic Energy Commission to explore the subject of regional conferences between engineering colleges and Atomic Energy Commission officials. Liaison with the Atomic Energy Commission is being continued, and assistance is being given in arranging the details of a preliminary conference of the Steering Committee with Atomic Energy Commission officials, to be held in Washington on June 2 and 3, at which your Vice-President will preside.

"Engineers—Too Many or Too Few"

A news release, which had the approval of five members of the ASEE Manpower Committee who live in and near Washington, and of the Chairman of the Manpower Committee, was approved by the Executive Board on March 1, 1950, and released by Secretary Bronwell on March 15. A slightly modified version of this statement was published in an issue of *Higher Education*.

A joint enterprise was worked out with the Office of Education whereby reprints of this article accompanied by a letter over President Saville's signature were prepared at Society expense and about 5600 copies were mailed at Office of Education expense to the following groups:

1. All private high schools for boys in the United States.
2. All public, regular, senior, and senior-junior high schools for white students which last year enrolled 300 or more students.
3. All Chief State School Officers.
4. All engineering deans.

5. About 200 educational journals, the Associated Press, and the United Press.
6. All members of the ASEE Executive Board.

One thousand copies were sent to Secretary Bronwell for distribution to engineering colleges. As soon as this reprint reached the engineering deans, both Secretary Bronwell and your Vice-President began to receive letters and telegrams from Deans asking for large numbers of copies of the reprint. In view of this demand, a second printing of 5000 copies, and a third printing of 8000 copies, were made and sent to Secretary Bronwell for sale to engineering deans at cost (approximately 1½ cents per copy).

It is evident that the article is attracting considerable attention, and it is hoped that it may help to offset the unfavorable impression created, not so much by the Bureau of Labor Statistics report as by some of the press releases about that report.

Service on ASEE Committees

Your Vice-President is continuing his membership of the Society's Committee on Secondary Schools, on the Cooperative Engineering Education Division's Committee on Relations With Federal Agencies, and on the Society's Manpower Committee. In the latter capacity, he is preparing three reports for presentation at the June meeting; namely, an estimate of the supply of engineers for the near future, a discussion of methods of predicting future engineering enrollments, and a discussion of the prospective demand for engineering teachers.

Respectfully submitted,

HENRY H. ARMSBY, *Vice-President in charge of General and Regional Activities, and Associate Chief for Engineering Education, U. S. Office of Education*

College Notes

A curriculum in nautical engineering, to provide professional training for graduate engineers and scientists, has been established jointly by the Graduate School of **Stevens Institute of Technology** and **Webb Institute of Naval Architecture.**

A new curriculum for combined liberal arts-engineering education has been announced by six Middle Western colleges. Participating in the new plan are Coe College, DePauw University, Marietta College, Oberlin College, Ohio Wesleyan University, and **Case Institute of Technology.** The plan, designated as the "Binary Curriculum," involves three years of study at one of the liberal arts colleges and two years and a summer of work at Case. Upon completion of the graduation requirements of each institution, the student will receive the bachelor of arts degree from the liberal arts college at which he has taken his first three years of work and the bachelor of science degree in a specialized engineering field from Case.

Maurice Nelles, engineering and research manager for the Allen Hancock Foundation, University of Southern California, has been named professor of engineering research and director of the Engineering Experiment Station at the **Pennsylvania State College.**

Report of the Vice-President for Instructional Divisions

In July, following the Annual Meeting, a letter was sent to the various Division and Committee Chairmen enclosing a list of approved budgets and calling attention to the necessity for early planning of the program for the 1950 meeting at Seattle. In order to have the program printed and reach the membership well before the Annual Meeting, it is necessary to have the program in the office of the Secretary by February 1st on account of the delay in printing and mailing that is necessary under present conditions. The cooperation received was gratifying and greatly appreciated by Secretary Bronwell and your Vice-President.

Attention of the various chairmen was called to the reservation of a page in the Journal which any Division or Committee could use to convey any message desired to the general membership. Some Divisions took advantage of this page.

Division By-Laws

The chairmen were asked to file with the Secretary copies of any Division By-Laws which might be in effect. Six or seven Divisions have filed By-Laws; many of the others apparently do not have them. While a Division may be operating without a set of standard By-Laws, circumstances sometimes arise when they are necessary.

Conference for Old and New Division Chairmen

Last year, President Saville, then Vice-President for Divisions and Committees, called the first meeting of old and new chairmen at the Annual Meeting in Troy. Although called on short notice, this conference was so interesting and worthwhile that it has been placed on the regular program.

Support of Young Engineering Teachers Committee

This office was authorized by the Executive Committee to write to the various Deans of Engineering, calling attention to the conference for young engineering teachers to be held at Seattle and suggest that the various schools might wish to defray a part or all of the expenses in attending the Annual Meeting for some young instructor on the engineering staff. The importance of encouraging the activity of young staff members in the affairs of this Society cannot be over-emphasized. The Society can do much for these young men and these young men can likewise do much for the Society. Several letters were received from deans who stated that they were glad to accept this suggestion.

Division Publications

A number of Divisions are publishing excellent printed or mimeographed bulletins of special interest to Division members. These bulletins often contain papers presented at meetings of the Society which are of special interest to members of the particular Division. Some of these publications are issued regularly, others at unspecified intervals. On account of the cost of publication and mailing, the Journal cannot be enlarged to carry many papers of special interest which would be read by a relatively small portion of the Society membership. It is believed that these special publications are very appropriate and serve an important need. They are self supporting,

sometimes by subscription from the membership of the Division and sometimes by solicitation of commercial advertising.

Summer Schools

Three summer schools have been approved by the Executive Committee; one by the Humanities Division is being held here in Seattle immediately following this Annual Meeting. Another by the Mechanics Division to be held at Iowa State College in September of this year. A third was sponsored by the North Midwest Section and was held at the University of Minnesota. This summer school was devoted to an analysis of good teaching, a discussion of teaching methods, evaluation methods, visual aids, etc., from an all-engineering school standpoint. It was first suggested in a Mechanical Engineering Division meeting at the North Midwest Section Conference held at the University of Iowa last fall. It was taken up and sponsored by the young men of the North Midwest Section. The General Sessions were open to all teachers of engineering but departmental conferences were held following the general meeting. One hundred and sixty young engineering teachers attended this conference although it was held during the school year and not in the summer vacation as has been customary. Each of the one-hundred and sixty registrants was presented with a copy of the booklet "Effective Teaching" published by the McGraw Hill Book Company and sponsored by the ASEE. It may be noticed that this conference or school was held on a Section basis rather than on a Division basis.

Several questions have been raised regarding the operation of summer schools and a Committee has been giving it some thought this past year. The majority of this Committee seem to feel there is some question as to whether the name should be changed to a Conference, Seminar, or some other designation (but are not ready to recommend a change) and whether the designation "summer" should remain. It is agreed emphasis should be placed upon the attendance of young men but, at the same time, the advice of those experienced in the teaching field is vital. It is thought that the size of the summer school should depend upon the arrangement of the program and what subject matter is being presented. It is thought that summer schools should be devoted to problems in teaching, new methods of presentation, organization of curricular material, and similar topics, with concrete examples of how the teaching may be done, rather than include involved discussions of technical matters, research, etc. This Committee sees no reason why the number of summer schools authorized by the Executive Committee of the Society should be limited in any one year. Schools should be held where the cost of attending the school and transportation is a minimum. Summer schools held in connection with the Annual Meeting are very desirable but only a limited number can be accommodated at that time. The length of summer schools may well be from three days to one week.

A summer school for Physics teachers was contemplated either at Northwestern University or Pennsylvania State College or at both schools, to be sponsored by the American Association of Physics Teachers and the Physics Division of the ASEE. It was felt that there was not sufficient time to organize the school this year and that it should be postponed.

With the discontinuance of accelerated programs for veterans, it should be possible again to build up this important activity of the Society which had been growing up to the beginning of World War II. It is submitted that a summer school project is a worthy challenge to any Division.

Respectfully submitted,

B. J. ROBERTSON, *Vice-President for Instructional Divisions*

Report of Secretary

During the past year, the Society has completed several important current projects and has forged ahead into new areas which offer considerable promise of making significant contributions to the improvement of engineering education. In some of these projects, attempts have been made to establish closer working relationships with administrators of engineering colleges, in order that the Society might be of direct assistance to the colleges and benefit by their advice in problems of national scope. Also during the past year, the Society has taken a constructive part in its relationships with the Federal Government and in legislative matters which have a direct bearing upon engineering education.

Improvement of Teaching

The foremost objective of the Society is "the improvement of engineering education." In the furtherance of this objective, the Society has launched a comprehensive three-fold program. The first phase, which is now completed, consisted of the preparation of a manual entitled "Effective Teaching," written by Professor Fred Morris under the sponsorship of a Society Committee on Teaching Manual. It presents in clear, concise language the problems confronted by teachers, and the techniques to be considered in developing effective teaching methods. Many engineering deans are supplying free copies to their new faculty members. McGraw-Hill Book Company is the publisher. The author and Society have waived royalties in order to bring this manual to the Society membership at the lowest possible price.

The second phase of the program aimed at the improvement of engineering education is the appointment of a Committee on the Improvement of Teaching. This Committee was constituted by the General Council to examine critically the philosophy of engineering education and to inquire into the effectiveness of various instructional methods. Particular attention is being given to an examination of those instructional methods which develop the intellectual powers of the student and which help him to acquire confidence, resourcefulness, and ability in solving new problems and situations. The objective of this Committee has been clearly defined in a preliminary study by a Steering Committee. The Officers of the Society view this undertaking as a project of first magnitude importance which holds promise of making a significant contribution to the improvement of engineering education.

The third phase of the program for the improvement of teaching is the work of the Teaching Aids Committee, under the sponsorship of the Division of Educational Methods. This Committee has formulated a plan for the reviewing of teaching aids by competent reviewing committees, which represent various curricular Divisions of the Society. It is contemplated that a bulletin will be prepared which will list those teaching aids regarded by the reviewing committee as suitable for engineering instruction. This bulletin will include a brief description of the teaching aid, a statement as to where it best fits into the educational program, the equipment required for its use, and how the teaching aid can be obtained. It is expected that such a bulletin would greatly simplify the instructor's problem of selecting suitable teaching aids and would thereby increase their classroom use. This program would also bring pressure to bear upon the companies to

seek the advice of engineering teachers before proceeding with the construction of teaching aids which are intended for engineering instruction. The Committee plans to solicit funds from industry to defray the cost of the project.

An exhibit of ingenious teaching aids prepared by engineering teachers for their own classroom use was held at the Annual Meeting of the Society.

Employment and Manpower

In recent months the Society has undertaken two projects in cooperation with administrators of engineering colleges. One was an attempt to increase the number of job opportunities for engineering students graduating in 1950 and 1951, and thereby assist the engineering colleges in their placement problem during this period when the graduating classes are abnormally large. The second project was that of helping to counteract the sharp decline in engineering enrollments at the freshman level. Both problems are national in scope and exemplify ways in which coordinated action through the Society can be of direct assistance to engineering college administrators.

The first problem—that of expanding the job opportunities for engineering graduates—was efficiently handled by the Society's Division of Relations With Industry. A small brochure entitled "Engineers Offer New Frontiers" was prepared by Mr. Hellwarth and other members of the Division for widespread distribution to industry, particularly to the smaller companies and non-technical industries which normally do not hire engineers. This brochure points out that modern industry is turning more and more to the engineer to solve its highly complex technological, production, and managerial problems. It suggests that many companies can profitably strengthen their organizations and improve their competitive positions by hiring engineering graduates during this brief period when the supply is plentiful. It also describes how company representatives can utilize the personnel services of engineering colleges. The brochures were printed by the Society and over 25,000 have been distributed by engineering colleges throughout the country.

The opposite phase of the problem—that of reversing the decline in engineering enrollments—appeared to be primarily a public relations problem. This was effectively handled by the Administrative Council's Manpower Committee. Vice President Armsby, working in cooperation with the Manpower Committee, prepared an article entitled "Engineers—Too Many or Too Few." The article appraises the supply and demand of engineering graduates in the years ahead and emphasizes the probable deficiency in the number of engineering graduates three or four years hence, owing to the sharp decline in new enrollments. This article was published in Higher Education, and was widely distributed to high schools, engineering colleges, and the public press.

In June 1950, the Manpower Committee made a telegraphic survey of employment of June graduates. This survey showed that approximately 80% of June graduates either were placed or had accepted job offers, thus disproving the misconception of a serious oversupply of engineers. The results of this survey have been released to the public press. A more recent release of the Manpower Committee points out that there is indicated a serious shortage of engineers due to sharp reductions in the number of engineering graduates.

Unification of the Profession

A development of considerable importance to all engineers is the series of conferences now being held on unity of the profession. A committee composed of representatives from sixteen major engineering societies is studying various proposals for the formation of a unifying engineering society, which would represent the entire profession, particularly in matters relating to legislative proposals bearing on engineering, relationships between the engineering profession and the

government, and other matters of public policy. President Saville has been an active participant in these discussions as the Society representative.

The Committee deliberations are now in the early exploratory stage and considerable work has yet to be done before specific proposals are turned over to the engineering societies for their consideration. Your Officers will endeavor to keep the Society membership informed on the progress of these important developments.

Atomic Energy Conference

Recently a proposal was made by President Saville to the Atomic Energy Commission to organize a series of regional conferences to be held under the joint sponsorship of the Society and the Atomic Energy Commission. The proposal was accepted by the Atomic Energy Commission and an interim committee containing representatives from each of the Atomic Energy districts, has been appointed to outline preliminary plans for the regional conferences. Regional committees will be appointed to carry out the detailed planning of the regional conferences.

Costs of Engineering Education

Considerable apprehension has been expressed by administrators of universities and colleges over the problems associated with the financing of higher education. The Association of American Universities has recognized the problem of financing higher education as a strategic national problem which is deserving of critical analysis. Accordingly, they have requested and received grants from the Rockefeller Foundation and the Carnegie Corporation to conduct a comprehensive study, which would include an analysis of the costs and the methods of financing higher education. Your Society has accepted an invitation from the Association of American Universities Commission to appoint an Advisory Committee to assist this Commission in formulating policies and procedures relating to that portion of the study dealing with the costs of engineering education. This project will probably get under way this fall.

National Science Foundation

Your Society, through its Engineering College Research Council, has vigorously and energetically promoted passage of the National Science Foundation legislation. The enactment of this bill constitutes a significant accomplishment of this Society as well as of the Engineers' Joint Council and other cooperating organizations. The Society has cooperated with the Engineers' Joint Council in the preparation of a list of leading engineering educators as nominees for the Science Foundation Board.

Utilization of Engineering Colleges in a National Emergency

Several engineering deans have expressed concern over the need for collaboration between the Society and the U. S. Military Establishment in the preparation of educational plans in the event that a national emergency should arise. It is believed that advanced planning might avoid the confusion and pitfalls of a hastily, extemporized educational program.

Your President has corresponded with top-level authorities in the Military Establishment, offering the cooperation of the Society in formulating such plans and suggesting that the planning might include:

(1) A prediction of the numbers of scientific, engineering, and technological personnel needed;

(2) The planning of specific educational programs at all levels from subprofessional to post-graduate;

(3) An adequate plan for draft deferment of students, research personnel, and engineering teachers.

This problem will be considered further by the Committee on Military Affairs of the Administrative Council.

Summer Schools

This year, the Society sponsored four Summer Schools. These included: Engi-

neering Mechanics at Iowa State College; Social Humanistics at the University of Washington; Civil Engineering (Photogrammetry) at University of Denver; and a teaching symposium sponsored by the North Midwest Section.

Meetings of ECAC and ECRC

The ECAC and ECRC held highly successful meetings in Kansas City in November, 1949. The program of the Administrative Council included five papers on the general subject of Education and Opportunities for Engineers in Nuclear Engineering. The program of the Research Council included a symposium on Research Policies and Pitfalls.

Society Organization

From an organizational and operational standpoint, several modifications have been made during the year in the Society operations. The Society Committees were reorganized, consolidated, and each committee was assigned to report to a specific Council of the Society.

The procedure for the election of Society officers was modified during the year. Under the new procedure, nomination forms are published in early issues of the Journal and the nominating committee conducts a preliminary poll before its official meeting in June. The election is conducted earlier in the program of the Annual Meeting than heretofore, thereby permitting the new officers to formulate plans for the next year's activities before the Annual Meeting adjourns.

It is becoming increasingly evident that the relationships between the Society and the federal government are expanding rapidly. In the past, there has been no coordination between various groups within the Society which deal either directly with government agencies or which make recommendations with regard to federal legislative measures. President Saville has proposed that a coordinating committee be appointed to interrelate various groups within the Society which have relationships with the government. This would avoid duplication of effort, serve to keep the various committees informed of the direction and progress being made, and prevent cross-purpose actions.

During the past year, the Society has cooperated with the U. S. Office of Education in the collection and tabulation of enrollment statistics. These enrollment statistics, which are now published in the Yearbook issue, have proven indispensable in the manpower studies during this transitional period following the war.

Division and Section Activities

A new award, the James H. McGraw, Sr. Award, was announced during the year by the Technical Institute Division. This award will be bestowed annually upon the person who has made distinguished contributions to the teaching, and administration of Technical Institutes.

A Committee on Young Engineering Teachers, under the Chairmanship of Professor Schwarz, has outlined a program for increased participation of younger faculty members in Society activities. Their activities includes a conference program tomorrow morning.

During the past year, highly successful conferences were held by the Administrative Council, the Research Council, the Division of Relations With Industry, the Drawing Division, the Technical Institute Division, and the Cooperative Engineering Division.

The Sections Committee of the Society has prepared a manual of operation of Sections, which is intended as a guide for Section officers.

New Publications Available

A manual, "Cooperative Engineering Education at the Graduate Level," consisting of a compilation of papers presented at a joint meeting of the Divisions of Graduate Studies and Cooperative Engineering in Troy, N. Y., in June, 1949, is now available at the Secretary's Office at the price of thirty cents per copy.

A small booklet, "Speaking Can Be Easy for Engineers," which was prepared

by the Committee on Relations with Industry, is now available at fifty cents per copy and can be purchased from the Engineers' Council for Professional Development, 29–33 West 39th Street, New York 18, N. Y.

The ECRC has announced publication of its proceedings which includes papers given before the Research Council in Troy, N. Y., June 1949. The price is $1.50 to ASEE members; $2.00 to non-members.

Participation in the Activities of Other Societies

The Society continued its active participation in the Engineers' Council for Professional Development, the American Council on Education, the American Association for the Advancement of Science, the Educational Testing Service, the National Research Council, and the American Standards Association. Society representatives have been appointed to all of these organizations and in a number of cases the Society, through its representative, has contributed significantly to the work of these organizations.

Membership

The Membership Committee has done a superb job again this year in adding over 1000 new members to our membership rolls. They deserve our very hearty congratulations for their outstanding success.

Respectfully submitted,
ARTHUR BRONWELL,
Secretary

College Notes

The **University of Missouri** is establishing an engineering extension program under the Adult Education and Extension Service to extend the services of the College of Engineering to the profession and industry of Missouri. Professor R. T. Quick is in charge of the program and will work closely with the staff of the College of Engineering. Programs will be conducted in the State or on the campus by means of conferences, brief and intensive short courses of several days duration, credit and non-credit extension classes, and correspondence instruction.

The Department of Aeronautical Engineering of the **University of Texas** has announced the establishment of a new degree program, leading to the Bachelor of Science degree in Meteorology, beginning in September 1950.

The appointment of Prof. Harry J. Loberg as director of Sibley School of Mechanical Engineering at **Cornell University** was announced by Acting President Cornelis W. de Kiewiet. A member of the Cornell faculty since 1934, Professor Loberg became acting director last year.

Report of Treasurer, 1949-1950

Evanston, Illinois
July 15, 1950

Mr. James S. Thompson, Treasurer
American Society for Engineering Education
Evanston, Illinois

Dear Mr. Thompson:

In accordance with your instructions we have examined the accounts and records of the American Society for Engineering Education for the year ending June 30, 1950 and submit herewith the following statements prepared therefrom:

Exhibit I—Comparative Balance Sheets
Exhibit II—Comparative Statements of Changes in Funds
Exhibit III—Comparative Statements of Income and Expense
Exhibit IV—Comparative Statements of Receipts and Disbursements

In connection with the statements as of June 30, 1950, we examined and tested the accounting records, traced the receipts as recorded to deposit, checked the disbursements, counted the securities on hand, and secured direct confirmation for all funds or securities in the hands of outside parties. Our examination was made in accordance with generally accepted auditing standards and included all procedures which we considered necessary in the circumstances.

In accordance with a resolution of the Board of Directors, the excess of income over expense for the year ending June 30, 1950, amounting to $7,543.07, has been transferred to a Reserve for Special Projects, and so appears on the balance sheet.

The Reserve for ECRC of $1,315.03, shown on the balance sheet, represents the accumulated excess of receipts over disbursements for the past four years.

In our opinion these statements fairly present the position of the Society at June 30, 1950 and the results of its operations for the period then ended.

Yours truly,

ERNEST C. DAVIES
Certified Public Accountant

AMERICAN SOCIETY FOR ENGINEERING EDUCATION
COMPARATIVE BALANCE SHEETS

	June 30, 1949	June 30, 1950
Assets		
Current Fund:		
Cash in State Bank & Trust Co.	$38,512.44	$26,280.79
Cash in Mellon National Bank	689.42	—
Petty Cash Fund	300.00	300.00
U. S. Government Bonds Series G	20,700.00	30,700.00
	$60,201.86	$57,280.79
Life Membership Fund:		
Cash—Checking	$ 129.70	$ 155.87
U. S. Government Bonds Series G	1,000.00	1,000.00
	$ 1,129.70	$ 1,155.87

B. J. Lamme Fund:		
Cash—Checking	$ 335.89	$ 276.93
Principal Cash in Hands of Trustee	9.00	9.00
Securities and Mortgages	5,132.73	5,132.73
	$ 5,477.62	$ 5,418.66
Accounts Receivable:		
Advertising	$ 1,855.00	$ 2,503.85
Less: Reserve for Bad Debts	315.00	315.00
	$ 1,540.00	$ 2,188.85
Dues	1,200.00	1,400.00
Brochures	——	631.20
Westinghouse Educational Foundation	109.58	209.73
Income Cash in Hands of B. J. Lamme Fund Trustee	110.71	121.44
	$ 2,960.29	$ 4,551.22
Inventory (Nominal)	$ 1.00	$ 1.00
Furniture and Fixtures	748.78	748.78
Total Assets	$70,519.25	$69,156.32
Liabilities		
Current Liabilities:		
Accounts Payable—Publications	$ 1,600.00	$ 2,110.54
Other Accruals	105.86	371.87
	$ 1,705.86	$ 2,482.41
Prepaid Membership Dues	$ 1,099.75	$ 1,195.20
Funds:		
Life Membership Fund	$ 1,129.70	$ 1,155.87
B. J. Lamme Fund	5,477.62	5,418.66
General Education Board	14,950.00	9,950.00
Carnegie Corporation	4,745.21	——
	$26,302.53	$16,524.53
General Fund		
Reserve for ECRC		$ 1,315.03
Reserve for Special Projects		7,543.07
Unappropriated Surplus	$41,411.11	40,096.08
	$41,411.11	$48,954.18
Total Liabilities and Net Worth	$70,519.25	$69,156.32

COMPARATIVE STATEMENT OF CHANGES IN FUNDS

	12 Months Ended June 30, 1949	12 Months Ended June 30, 1950
GENERAL EDUCATION BOARD, SE SECTION		
Balance at Beginning of Period	$17,450.00	$14,950.00
Less: Charges during the Period	2,500.00	5,000.00
Balance at End of Period	$14,950.00	$ 9,950.00
CARNEGIE CORPORATION, ENGINEERING SALARY SURVEY		
Balance at Beginning of Period	$ 5,730.72	$ 4,745.21
Add: Transfer to General Fund for Charges made against it in 1948	269.28	——
	$ 6,000.00	$ 4,745.21
Less: Expense for the Period	$ 1,254.79	$ 3,000.92
Refund to Carnegie Corporation	——	1,744.29
	$ 1,254.79	$ 4,745.21
Balance at End of Period	$ 4,745.21	——
SURPLUS, GENERAL FUND		
Balance at Beginning of Period	$37,133.84	$41,411.11
Add: Income credited to Lamme Fund in 1948 instead of General Fund	116.11	——
Summer School Fund previously independent of General Fund	689.42	——
Excess of Income over Expense for the Period	3,741.02	7,543.07
	$41,680.39	$48,954.18
Less: Transfer Charge for Carnegie Salary Survey	$ 269.28	——
Restriction of Surplus for ECRC Reserve	——	$ 1,315.03
Restriction of Surplus for Special Projects Reserve	——	7,543.07
	$ 269.28	$ 8,858.10
Balance at End of Period	$41,411.11	$40,096.08

COMPARATIVE STATEMENT OF INCOME AND EXPENSE

	12 Months Ended June 30, 1949	12 Months Ended June 30, 1950	Budget 1950–51
Income:			
Current Dues—Individual	$33,145.83	$38,468.18	$39,000
—Institutional	6,862.50	7,010.00	7,000
Sale of Publications	1,793.78	3,341.30	1,800
Advertising	8,354.68	10,045.16	9,000
Interest on Government Bonds	542.50	667.50	700
Refunds	74.89	——	——
ECRC	2,053.94	1,031.75	——
Income—B. J. Lamme Fund	110.71	10.73	——
Miscellaneous	——	39.22	——
Total Income	$52,938.83	$60,613.84	$57,500
* Special projects reserve	———	———	$7,543.07
Expense:			
Cost of Publications	$20,542.29	$23,632.60	$24,800
Administrative Salaries	9,545.40	10,922.10	11,000
Retirement Emeritus	1,360.00	1,360.00	1,360
Postage, Telephone & Telegraph	1,816.19	1,595.50	1,800
Supplies & Sundry Printing	2,177.45	2,052.68	2,350
Dues—Amer. Council of Education	100.00	100.00	100
Contribution ECPD	500.00	500.00	500
Officers Traveling Expense	825.85	1,510.91	2,000
President's Expense	——	——	500
Travel—Secretary's Office	788.47	989.94	950
Provision for Bad Debts	315.00	——	——
Expenses 1949 Meeting	2,040.78	——	——
Expenses 1950 Meeting	——	2,737.84	2,700
Expense ECAC	398.77	733.44	2,200
Expense ECRC	7,051.08	4,344.18	4,350
Committees and Conferences	487.06	609.95	1,700
Expenses—Lamme Fund	239.03	——	——
Special Projects and Contingencies	1,010.44	1,991.63	5,000
Total Expense	$49,197.81	$53,070.77	$61,310
Excess of Income over Expense	$ 3,741.02	$ 7,543.07	

* On June 19, 1950, the Executive Board voted to set aside the excess of income over expense for the 1949–50 fiscal year as a special projects reserve fund.

COMPARATIVE STATEMENT OF RECEIPTS AND DISBURSEMENTS

	12 Months Ended June 30, 1949	12 Months Ended June 30, 1950
Balance at Beginning of Period	$37,175.25	$39,201.86
Receipts:		
Current Dues—Individual	$31,666.58	$35,435.18
—Institutional	6,662.50	7,010.00
Back Dues	1,100.50	1,733.25
Dues in Advance	1,099.75	1,195.20
Sale of Publications	1,915.75	2,710.10
Advertising	8,354.68	9,396.31
Interest on Bonds	542.50	667.50
ECRC	2,053.94	1,031.75
Westinghouse Educational Foundation	250.00	222.29
Lamme Fund Income	113.87	——
Refunds	74.89	——
Summer School Transferred to General Fund	689.42	——
Miscellaneous	——	39.22
Total Receipts	$54,524.38	$59,440.80
Disbursements:		
Cost of Publication	$20,310.56	$23,122.06
Administrative Salaries	9,545.40	10,922.10
Retirement Emeritus	1,360.00	1,360.00
Travel—Secretary's Office	788.47	989.94
Postage, Telephone and Telegraph	1,776.72	1,656.67
Supplies and Sundry Printing	2,177.45	2,052.68
Dues—American Council on Education	100.00	100.00
Contribution ECPD	500.00	500.00
Officers Traveling Expenses	825.85	1,510.91
Expenses 1949 Meeting	1,989.39	——
Expenses 1950 Meeting	——	2,422.36
Expenses ECAC	398.77	733.44
Expenses ECRC	7,051.08	4,334.18
Committees and Conferences	472.06	598.25
Westinghouse Award	200.00	322.44
Expense—B. J. Lamme Fund	236.79	——
Special Projects and Contingencies	1,010.44	1,991.63
Expense—Carnegie Survey	1,254.79	4,745.21
Award—General Education	2,500.00	5,000.00
Purchase of Government Bonds	——	10,000.00
Total Disbursements	$52,497.77	$72,361.87
Balance at End of Period:		
Checking—State Bank and Trust Co., Evanston	$38,512.44	$26,280.79
Savings—Mellon National Bank, Pittsburgh	689.42	——
	$39,201.86	$26,280.79

Respectfully submitted,

JAMES S. THOMPSON,
Treasurer

Minutes of Executive Board Meetings

A meeting of the Executive Board of The American Society for Engineering Education was held on Monday, June 19, 1950 at the University of Washington, Seattle, Washington. Those present were: Thorndike Saville, *President*, H. H. Armsby, A. B. Bronwell, F. M. Dawson, B. J. Robertson, J. H. Lampe (representing F. E. Terman), M. M. Boring (invited guest), and M. Strohm.

A number of items considered by the Executive Board were referred to the General Council. These items are reported in the Minutes of the General Council Meetings.

Report of the Secretary

The Secretary presented a written report summarizing the year's activities. This report is published in this issue of the *Journal*.

Report of the Treasurer

The report of the Treasurer was presented, including the tentative annual audit, which was accepted by the Board. The Board approved the proposed budget for 1950–51 with the following provisions:

a. A grant of $2,400 was approved for use of the Committee on Improvement of Teaching for this year only. If further financing is needed at the end of the year, an appeal would be made to other sources to defray at least part of the expenses.

b. A motion was approved to allot an amount up to $1,000 for the joint use of the Manpower Committee and a corresponding committee of EJC for a survey of employment of 1950 engineering graduates. The survey will lead to an analysis of types of jobs filled by engineering graduates.

c. The Board voted to set aside the 1949–50 excess of income over expenses as a Special Projects Reserve which can be drawn upon for special projects undertaken during the coming year.

Unity of the Profession

President Saville reported on progress which was being made by the Committee on Unity of the Profession, representing sixteen major engineering societies. This report is described more fully in the Minutes of the General Council Meeting.

President Saville reported that he had investigated tentatively whether or not the Engineers' Joint Council would be receptive to ASEE membership in EJC. All but one of the constituent societies of the EJC favor ASEE membership, the dissenting society officers expressing the opinion that ASEE membership in EJC should be deferred pending the outcome of the Unity of the Profession Conference.

Cooperation With the Military Establishment in Planning Emergency Educational Program

President Saville reported on the steps which he had taken to establish relationships with the U. S. Military Establishment in planning educational and research programs in the event of a national emergency. His report is summarized in the Minutes of the General Council Meeting.

Secondary Schools

The Secretary reported on a letter he had received, commenting on the inadequacy of secondary school education. The Board recommended that the letter be referred to the Committee on Secondary Schools.

Application of Howard University for Membership

The Board unanimously voted to approve the application of Howard University for active institutional membership in the Society.

Branches at University of Tennessee and Texas A & M

The Board approved requests for Branches of the Society at the University of Tennessee and Texas A & M, subject to the approval of the Committee on Sections and Branches.

Annual Meeting in 1952

It was moved and seconded to accept the invitation of Dartmouth College to hold the Annual Meeting in 1952 on their campus. The Board recommended that this invitation be presented to the General Council for their approval at the Council Meeting on Monday evening.

Appointment of the Secretary

The Board voted to reappoint Arthur B. Bronwell Secretary of the Society for the year 1950–51.

Fall Meeting of ECAC and ECRC

It was announced that meetings of ECAC and ECRC would be held in Washington, D. C. during the week of the Land Grant College meetings, November 13–17, 1950.

A meeting of old and new members of the Executive Board of The American Society for Engineering Education was held on Wednesday, June 21, 1950 at the Meaney Hotel in Seattle, Washington. Those present were: Thorndike Saville, *President,* H. H. Armsby, A. B. Bronwell, F. M. Dawson, L. E. Grinter, B. J. Robertson, G. A. Rosselot, C. L. Skelley, F. E. Terman, and M. Strohm.

Publication of Article on Standardization

The Board voted to publish an article on the subject of Standardization, not to exceed three pages in length, in the JOURNAL OF ENGINEERING EDUCATION, after referring it first to the Mechanical Engineering Division for possible program material.

ASEE Policy Regarding Branches in Technical Institutes

An application for a Branch of the Society in an ECPD accredited Technical Institute has raised the question as to what the policy of the Society should be with respect to Branches in Technical Institutes.

The Executive Board expressed sympathetic interest in the encouragement and recognition of such groups, but as it is a new problem with important professional implications, the Board recommended to the Council that the matter be investigated by the Vice President in charge of General and Regional Activities and be reported to the next meeting of the Executive Board for action at the Fall Meeting of the Council.

Civil Engineering Summer School

The Executive Board voted to approve ASEE sponsorship of a Summer School in Photogrammetry in Civil Engineering at the University of Denver on August 7–11, 1950.

ECRC Budget

The Executive Board voted to allocate to the ECRC $1,000 to assist in the publication of "Current Research" in addition to the ECRC budget of $3,350.

Study of Annual Meetings

The Board requested the Secretary to make a study of the last three Annual Meetings of the Society for the purpose of securing information on the cost of meals, deficits, accommodations, how they were underwritten, what reasonable costs were for the different services, etc.

Institutional Membership in Sections

The question has been raised as to whether or not members representing industrial organizations can form a Section. The Executive Board expressed the opinion that each Section should include a minimum of two Active Institutional members.

Respectfully submitted,
ARTHUR BRONWELL,
Secretary

Minutes of General Council Meetings

Report of the Secretary

The Secretary reported briefly on the progress of several current projects as follows:

(a) The manual, "Effective Teaching," has been published and approximately 10,000 copies have been sold in the three months since it was announced.

(b) A brochure, "Engineers Offer New Frontiers," prepared by the Division of Relations With Industry for the purpose of expanding employment opportunities for engineers, had been widely distributed to industries throughout the country.

(c) Over 13,000 copies of Mr. Armsby's article, "Engineers—Too Many or Too Few," have been distributed to engineering colleges, the public press, and high schools throughout the country in an effort to reverse the decline in engineering enrollments.

(d) The Secretary reported briefly on the progress of the Teaching Aids project and stated that the Committee is planning to solicit funds from industry to defray the cost of handling the project.

Report of the Treasurer

The Treasurer's report was presented, including the tentative annual audit and the budget for 1950–51. The cash position of the Society has decreased due to three items: (a) the purchase of $10,000 worth of government bonds during the year, (b) the payment of approximately $5,000 to the Southeast Section out of a special grant made by the General Education Board, and (c) a special grant made by the Carnegie Corporation for a salary survey to be conducted by the Society was closed, and the balance was returned to the Carnegie Corporation, resulting in cash payments of approximately $5,000.

Tax Exempt Status of the Society

The Secretary announced that the Society has inquired of the Treasury Department as to its income tax status. The Treasury Department has ruled that the Society is tax exempt and that gifts made to the Society are also tax exempt.

Unity of the Engineering Profession

President Saville reported on the progress of Conferences on "Unity of the Engineering Profession." He stated that representatives of 16 engineering organizations have met under the auspices of the Engineers Joint Council to explore ways and means of effecting an organization which would merge the public interest of the engineers and would have power to speak with authority to the government and the public on broad problems having engineering implications. He reported that a Planning Committee of eight members had met on numerous occasions to formulate specific proposals. The following three plans were initially proposed:

(a) A Unity Organization consisting of the existing National Society of Professional Engineers, with modifications to remove the requirement of professional registration for membership.

(b) An expansion of the existing Engineers' Joint Council providing for participation by all of the major professional engineering societies. This would be essentially a council-type organization as distinguished from the individual membership organization proposed by the NSPE.

(c) A compromise organization consisting of a council with representatives from the principal engineering societies and also providing for individual membership.

Later, a fourth plan was proposed which contemplates the expansion of the EJC to form a council-type of organization, but in addition providing for individual membership. All of these plans are now under consideration and specific proposals will be submitted to the participating societies at some future date. President Saville emphasized that the Constitution of the Unity Organization will undoubtedly have a minimum requirement for membership consistent with the present membership designations adopted by the ECPD. He stated that in his opinion it is vitally important for the Society to uphold its professional membership status in order not to jeopardize its future affiliation with the Unity Organization.

Report of Vice-President Armsby

Vice-President Armsby reported that a Sections Manual had been completed for use of Section Officers. He stated that the Manual is in tentative form and that his Committee on Sections would appreciate corrections from the Sections Officers during the year.

Vice-President Armsby stated that he had held several conferences with members of the State Department on the Point Four Program. He stated that the legislation had been enacted, although there was no appropriation. The Point Four Program would be administered by an Advisory Board consisting of not to exceed thirteen persons appointed by the President with the consent of Congress. In addition, there will be a number of committees serving in various specialized fields.

A request that the Committee on Sections be designated the Committee on Sections and Branches was approved by the Council.

Atomic Energy Conferences

At the suggestion of President Saville, a Steering Committee consisting of five members representing the five areas of the Atomic Energy Commission has been formed to plan a series of atomic energy conferences. The purpose of these conferences is to facilitate a flow of information on nuclear engineering into the engineering curricula. The following objectives were outlined by the Steering Committee:

(1) To evaluate the responsibilities of engineering education in aiding the growth and development of the atomic energy industry and to determine what there is in the development of nuclear engineering which can be used to enrich and strengthen engineering education.

(2) To assess the over-all needs for engineers with special training in nuclear engineering.

(3) To explore with AEC and its contractors subjects or fields of research which may be carried out by graduate students or engineering faculties.

(4) To define the needs of educational institutions with respect to instructional materials, (a) for the modification of existing courses in basic science and engineering, (b) for the modification of standard engineering curricula, and (c) for advanced training for engineers planning to specialize in nuclear engineering.

(5) To formulate plans for facilitating the flow of needed information regarding such instructional materials to the engineering schools.

Subcommittees will be appointed in each of the Atomic Energy Commission districts to plan the conferences. It is contemplated that they will consider:

(1) The organization of regional meetings to be attended by members of engineering faculties and representatives of AEC and its contractors.

(2) Temporary employment and exchange programs with AEC laboratories.

(3) Study of the needs of the atomic energy industry for engineers.

(4) Study of the kinds of published materials now available relating to these applications.

(5) Methods by which colleges and universities may make use of experts from AEC installations.

(6) Methods by which information about engineering applications may be

further identified and transmitted to colleges and universities in a useful manner.

(7) Cooperation with AEC in a program for declassification of engineering information as security permits.

Report of Vice-President Robertson

Vice-President Robertson reported on the excellent cooperation which the Society headquarters had received in handling the program arrangements for the Annual Meeting. He also commented on the constructive work of the conference of Division and Committee Chairmen.

Vice-President Robertson reported on the progress which his Committee on Summer Schools is making in their study of various types of Summer School programs. He pointed out that the University of Minnesota had originated a new innovation in Summer Schools, having held a Summer School devoted entirely to teaching methods and the science of teaching. He emphasized the importance of getting the younger faculty members to attend Society sponsored Summer Schools.

Report of the ECRC and ECAC

Vice-President Dawson submitted his written report and presented a new publication, "Research is Learning," which the ECRC had just completed.

J. H. Lampe reported on the activities of the ECAC. He briefly discussed the progress of the various committees of the ECAC and also reported on the success of the Conference at Kansas City last fall. He pointed out that considerable attention is being given by the Administrative Council to the problem of the supply and demand of manpower and stated that attempts would be made to determine more precisely what types of employment are accepted by engineering graduates in order to evaluate the demand for engineering graduates.

Coordinating Committee on Relations with the Government

President Saville briefly outlined his previous proposal that a Coordinating Committee on Relations with the Government be appointed. He stated that he had thus far been unsuccessful in getting a properly qualified person to accept Chairmanship of this Committee. He pointed out that there are numerous vital problems bearing on military educational programs, ROTC, and other government relations which should be coordinated through one central committee in order to avoid duplication of effort and cross purpose.

Registration Fee at the Annual Meeting

There was considerable discussion as to whether or not a registration fee should be charged at future Annual Meetings of the Society. It was pointed out that Rensselaer Polytechnic Institute experienced a substantial deficit as a result of their Annual Meeting. The University of Washington requested permission to charge a registration fee in order to avoid a deficit and accordingly, a $3.00 registration fee was authorized. It was pointed out that the cost of an Annual Meeting had increased substantially in recent years by virtue of the larger attendance and also the general inflation in prices. Two alternatives were discussed: (a) to charge a registration fee, and (b) to add an increment to the cost of the meals.

A registration fee would be paid uniformly by all persons attending the Annual Meeting. The increased meal cost would be borne by only those attending luncheons and dinners and would tend to discourage attendance at the luncheons and dinners. The possibility of raising the deficit from local merchants was also discussed. The opinion was expressed that our Society should be able to support its Annual Meetings without being in the position of soliciting funds from outside sources. It was also pointed out that it was undesirable for the host institutions to bear a substantial deficit since this would quickly discourage invitations from some of the more desirable schools.

A motion that the Council should not authorize charging of registration fees in the future was passed.

Pooled Travel Expense Plan

A proposal was presented which would provide for a travel expense pool, with each of the participating colleges contributing to the pool in order to provide expenses for representatives from each institution to attend the Annual Meeting of the Society. It was pointed out that state institutions could not participate in this plan, since it would be illegal in most states. A motion rejecting the plan was therefore passed.

Annual Meetings for 1951 and 1952

President Saville announced that the Annual Meeting for 1951 would be held at the Michigan State College, June 25–29, 1951, and that the 1952 Meeting would be held at Dartmouth College, June 23–27, 1952.

General Problems

A proposal was made that the Council consider three problems as follows:

(a) The possibility of holding a Summer School for engineering deans to present discussions on administrative problems in engineering colleges. It was pointed out that the Administrative Council had such a program planned for the Annual Meeting in Seattle, which consisted of a closed meeting for administrators of engineering colleges. This suggestion was referred to the Administrative Council.

(b) There is a serious ambiguity in our college system in that, despite the universally recognized need for a broad education for engineering students, it has been the practice of engineering colleges to populate their teaching staffs with highly trained specialists.

(c) It is generally recognized that there is a need for teaching excellence at the freshman and sophomore years in order that the engineering students get a sound foundation. Despite this need, the status of faculty members teaching freshman and sophomore subjects has been so degraded that good faculty members resent these teaching assignments. The Council voted to refer the second and third problems to the Committee on the Improvement of Teaching.

It was voted that the Division of Educational Methods should recommend to the Executive Board the objectives and scope of Summer Schools.

The Secretary pointed out that the Point Four Federal Legislation could provide substantial sums for education of foreign students in this country and suggested that a Committee of the Society might prepare a specific proposal which could be presented to government officials who are planning the Point Four Program, providing for scholarships and fellowships for foreign students who are interested in studying science and technology in this country. This suggestion was referred to the Committee on International Relations.

Life Membership

The following persons meet all of the requirements for life membership in the Society and the Council voted to grant them life membership: R. S. Crossman, Paul Cloke, Arthur S. Hill, Albert R. Johnson, Carl A. Norman, F. M. Porter, Charles E. Thomas, L. F. Van Hagan, J. R. Withrow.

Delinquent Members

The Council voted to drop eighty members of the Society who were delinquent more than two years in dues.

Resolution to Host Institution

A resolution thanking the host institution for their hospitality to the Council members and their wives at the Council Dinner was unanimously approved.

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A meeting of old and new members of the General Council was held at the University of Washington, Seattle, Washington, on Friday morning, June 23, 1950. Those present included: Thorndike Saville, *President*, F. M. Dawson, H. H. Armsby, B. J. Robertson, F. E. Terman, C. L. Skelley, A. B. Bronwell, L. E. Grinter, H. J. Barre, E. C. Clark, H.

H. Wheaton, H. K. Justice, K. L. Holderman, C. A. Brown, O. N. Olson, L. O. Stewart, T. L. Joseph, L. G. Miller, W. M. Lansford, H. W. Barlow, R. S. Paffenberger, R. P. Holescher, M. P. Capp, R. D. Landon, R. Z. Williams, H. R. Beatty, O. E. Osburn, W. H. Carson, W. T. Alexander (for E. R. McKee), R. L. Shurter (for J. E. Thornton), and M. Strohm.

Branches in Technical Institutes

The Secretary presented the recommendation of the Executive Board relating to the policy of the Society in forming Branches in Technical Institutes. The Council recommended that the matter be investigated by the Vice President in Charge of General and Regional Activities and be presented to the Executive Board and Council for action at the fall meeting.

Registration Fees

H. H. Wheaton requested the Council to reconsider its previous motion prohibiting registration fees at future Annual Meetings. He stated that a number of members with whom he had talked expressed the opinion that this action would either result in abnormally high charges for luncheons and dinners, thereby limiting attendance at the luncheons and dinners, or it would place a financial hardship upon the host institution. President Saville expressed the view that the resolution passed by the Council should not be regarded as an iron clad rule, and that if evidence in the future indicates that the host institution will suffer a substantial deficit, the matter should be reconsidered by the Council.

Educational Testing Services

H. R. Beatty stated that Mr. Johnson of the Educational Testing Service had requested the Society to express its views as to the future of the engineering tests being constructed and administered by the Educational Testing Service. The declining use of these tests has led the Educational Testing Service to question whether educators and administrators of engineering colleges are interested in continuing the research and operation of this service for engineering colleges, or whether it should ultimately be discontinued. The matter was referred to the Society Committee on Selection and Guidance for study.

Summer Schools

R. L. Shurter presented a request of the Humanistic Social Division for a Society sponsored Summer School to be held at Michigan State College in 1951. The Council approved the request. The Council approved Society sponsorship for a Summer School in Civil Engineering (photogrammetry) at the University of Denver, August 7–11, 1950.

Next Meeting of the General Council

It was announced that the next meeting of the General Council would be held in Washington, D. C., at the time of the meeting of the Land Grant College Association on November 16 or 17, 1950.

Respectfully submitted,

ARTHUR BRONWELL,
Secretary

Candid Comments

ENGINEERING MORALS AND PHILOSOPHY

The coming event which is casting its shadow before it quite plainly in engineering education is the trend toward a serious interest in the moral, ethical, religious and philosophical phases of an engineer's professional training. The occasion for this has been pointed out in two excellent papers published in this Journal last year: the first on "Education and Freedom from Fear," by Dean C. J. Freund of Detroit, and the second on "Value Judgments," by President R. E. Doherty of Carnegie Tech. In a sense this is an extension of the recently developed emphasis upon the "socio-humanistic stem" which now seems firmly established in our curricula. The ethical problem has, however, taken on a new urgency in the post-war world and there is a growing number who feel that engineering educators should no longer dodge the issue by leaving students entirely to their own devices in this area.

Dean Freund has stated the general problem very clearly, and he has also emphasized the fact that before we can effectively help our students in developing a sound professional philosophy we must first, as teachers, agree upon a few basic axioms and a method or approach that will give some semblance of unity and coherence to our efforts. In an attempt to present the matter in somewhat less general and more specific terms, the writer has listed, in a recent letter to President Saville, the following questions which might serve for the agenda for a session on this subject at one of our Society meetings:

1. *Why* should engineers concern themselves with moral questions?
2. To what authority should we appeal in cases of doubt or disagreement in specific ethical questions?
3. Do we sincerely subscribe to the principle implicit in: "My country, may she always be right, but, right or wrong, my country!"?
4. Do we really believe that each individual is a free and independent moral agent (enjoying "free will"), or to what extent is each man's behavior conditioned inexorably by his heredity and his environment?
5. Can we recognize any "natural law" in the area of ethics and morals—something fundamental enough to command universal respect among men of all faiths and creeds?
6. What should be the primary and basic compulsion impelling engineers to virtuous behavior?

Although some of these questions are highly controversial, they are of such importance that it would seem eminently worth while if we could arrive at even tentative or arbitrary answers to them, for our particular profession. The interest and encouragement of President Saville and other officers of the Society prompts the writer to urge that we concern ourselves actively with such questions, and with the general issue proposed by Dean Freund.

W. J. KING
Professor of Engineering, University of California, Los Angeles

Section Meetings

Section	*Location of Meeting*	*Dates*	*Chairman of Section*
Allegheny	Carnegie Institute	April, 1951	D. F. Miner Carnegie Institute
Illinois-Indiana	Purdue University	May 20, 1950	D. S. Clark, Purdue University
Kansas-Nebraska	Kansas State College	Oct. 13–14, 1950	F. W. Norris, University of Nebraska
Michigan	General Motors Institute	May 20, 1951	H. M. Dent, General Motors Institute
Middle Atlantic	Lehigh University	May 13, 1950	C. H. Willis, Princeton University
Missouri	Missouri School of Mines	April 1, 1950	C. M. Wallis, University of Missouri
National Capital Area	Naval Ordnance Laboratory	Oct. 3, 1950 Feb. 6, 1951 May 12, 1951	R. B. Allen, University of Maryland
New England	University of New Hampshire	Oct. 14, 1950	W. C. White, Northeastern University
North Midwest	University of Minnesota	Oct. 6 & 7, 1950	C. J. Posey, University of Iowa
Ohio	Ohio State University	April 29, 1950	S. R. Beitler, Ohio State University
Pacific Northwest	University of Idaho	1951	A. S. Janssen, University of Idaho
Pacific Southwest	Stanford University	Dec. 28 & 29, 1949	R. J. Smith, San Jose State College
Southeastern	Buena Vista Hotel	March 22, 23, 24, 1951	E. B. Norris, Virginia Polytechnic Institute
Southwestern	Texas A. & M. College	April, 1950	W. H. Carson, Oklahoma University
Upper New York	University of Buffalo	Oct. 13 & 14, 1950	F. H. Thomas, University of Buffalo

Members of the Society are welcome at all Section Meetings

New Members

ADDISON, ARNOLD, Associate Professor and Personnel Director Ordnance Research Laboratory, Pennsylvania State College, State College, Pa. R. A. Hussey, E. A. Walker.

ALLEN, ALFRED W., Associate Professor of Ceramic Engineering, University of Illinois, Urbana, Illinois. R. K. Hursh, A. I. Andrews.

ALTOZ, FRANK E., Assistant Instructor of Mechanical Engineering, Newark College of Engineering, Newark, N. J. G. B. Thom, A. B. Bronwell.

BABB, DANIEL S., Assistant Professor of Electrical Engineering, University of Illinois, Urbana, Ill. J. D. Ryder, C. A. Keener.

BARKSON, JOSEPH A., Assistant Professor of Electrical Engineering, University of Illinois, Urbana, Ill. P. K. Hudson, A. L. Barley.

BAUGH, ROBERT L., Instructor of Electrical Engineering, Colorado School of Mines, Golden, Colo. T. E. Payntee, F. R. Campbell.

BERGH, DONALD A., Instructor of Mechanical Engineering, Michigan State College, Lansing, Mich. D. J. Renwick, C. C. Sig er foos.

BOYER, MARION C., Assistant Professor of M & H, State University of Iowa, Iowa City, Ia. C. J. Posey, A. B. Bronwell.

BRANIN, M. LELYN, Chairman, Department of Chemistry, Newark College of Engineering, Newark, N. J. I. P. Orens, G. B. Thom.

BRECKENRIDGE, H. K., Vice President, West Penn Power Company, Pittsburgh, Pa. G. Klein, J. C. McKeon.

CHANG, SHURMAN Y., Assistant Professor of Electrical Engineering, University of Massachusetts, Amherst, Mass. R. R. Brown, J. W. Langford.

COUNTS, GERALD A., Professor of Physics and Chemistry, U. S. Military Academy, West Point, N. Y. B. W. Bartlett, R. I. Heinlein, Jr.

DECHANT, WILLIAM G., Assistant Professor of Electrical Engineering, Virginia Polytechnic Institute, Blacksburg, Va. W. A. Murray, E. B. Morris.

DELTORO, VINCENT, Instructor of Electrical Engineering, College of City of New York, New York, N. Y. G. J. Clemens, H. Wolf.

EATON, HAROLD D., Assistant Professor of Mechanical Engineering, Michigan State College, Lansing, Mich. L. C. Price, J. M. Campbell.

EDMISON, HAROLD R., Instructor of Engineering, City College of San Francisco, San Francisco, Calif. A. S. Levens, A. E. Edstrom.

ELDIN, HAMED K., Egyptian Government Mission Member, Fuad 1st University, Cairo, Egypt. A. B. Cambel, A. B. Bronwell.

ELIZONDO, YNDALECIO J., Instructor of T & AM, Iowa State College, Ames, Ia. A. W. Davis, A. Higdon.

FEENEY, EDMUND J., Director, Newark School of Industrial Drafting & Design, Newark, N. J. T. J. Fully, F. W. Bauder.

FETTY, HOMER D., Director of Business and Industrial Education, Los Angeles State College of Applied Arts and Sciences, Los Angeles, Calif. B. W. Martin, V. C. George.

GALLIGAN, WILLIAM E., Associate Professor of Civil Engineering, Iowa State College, Ames, Ia. W. C. Alsmeyer, A. Higdon.

GRACIDA, HENRY J., JR., Assistant Instructor of Architecture, University of Houston, Houston, Tex. W. B. Lowe, A. A. Rasmussen.

HAMILTON, HERBERT J., Instructor of Mechanical Engineering, Michigan State College, East Lansing, Mich. L. G. Miller, L. C. Price.

HANG, RICHARD I., Instructor of Engineering Drawing, Ohio State University, Columbus, Ohio. C. D. Cooper, R. S. Paffenbarger.

HARDING, FENTON, Associate Professor of Civil Engineering, Texas Technological College, Lubbock, Tex. F. L. McRee, J. H. Murdough.

HATHAWAY, SAMUEL L., Assistant Professor of Electrical Engineering, Virginia Polytechnic Institute, Blacksburg, Va. W.A. Murray, G. C. Barnes, Jr.

HEINE, RICHARD W., Assistant Professor of Metallurgical Engineering, University of Wisconsin, Madison, Wis. P. C. Rosenthal, G. J. Barker.

HEIPLE, LOREN R., Head, Civil Engineering Department, University of Arkansas, Fayetteville, Ark. G. F. Branigan, J. G. Gleason.

HOFFMAN, DWIGHT S., Assistant Professor of Chemical Engineering, University of Idaho, Moscow, Idaho. C. O. Reiser, H. W. Silha.

HORONJEFF, ROBERT, Lecturer and Research Engineer, University of California, Berkeley, Calif. H. E. Davis, R. A. Moyer.

HUTCHINS, JACQUE L., College Service, Educational Department, Westinghouse Educational Center, Pittsburgh, Pa. J. C. McKeon, A. B. Bronwell.

IMM, RUBEN A., Instructor of Electrical Engineering, University of Wisconsin, Madison, Wis. J. C. Weber, L. E. A. Kelso.

IP, CHING-U, Instructor of Mechanical Engineering, Michigan State College, East Lansing, Mich. L. G. Miller, L. C. Price.

KEACHIE, EDWARD C., Associate Professor of Mechanical Engineering, University of California, Berkeley, Calif. E. D. Howe, E. P. De Garmo.

KEARNS, CLYDE H., JR., Instructor of Engineering Drawing, Ohio State University, Columbus, Ohio. R. S. Paffenbarger, H. W. Shupe.

KINTNER, PAUL M., Instructor of Electrical Engineering, University of Illinois, Urbana, Ill. C. A. Keener, J. D. Ryder.

LAKE, WALTER S., Assistant Professor of Mechanical Engineering, University of Massachusetts, Amherst, Mass.

LIBBY, WILBUR E., Coordinator of Engineering, Michigan State College, East Lansing, Mich. L. G. Miller, L. C. Price.

MCCLELLAN, THOMAS J., Assistant Professor of Civil Engineering, Oregon State College, Corvallis, Ore. G. W. Holcomb, A. B. Bronwell.

MCCOLLY, HOWARD F., Professor of Agricultural Engineering, Michigan State College, East Lansing, Mich. A. W. Farrall, D. M. Fullmer.

METZLER, DONALD E., Assistant Professor of M. & H., State University of Iowa, Iowa City, Ia. C. J. Posey, A. B. Bronwell.

MILLER, BRUCE J., Personnel Administrator, Linde Air Products Co., Snyder, N. Y. R. F. McCook, L. E. Stout.

MOWBRAY, ALPHEUS Q., JR., Instructor of T. & A. M., University of Illinois, Urbana, Ill. W. M. Owen, W. M. Lansford.

MURPHY, GORDON J., Instructor in Electronics, Milwaukee School of Engineering, Milwaukee, Wis. A. P. Jones, F. J. Van Zeeland.

NEAL, JAMES P., III, Assistant Professor of Electrical Engineering, University of Illinois, Champaign, Ill. C. A. Keener, M. A. Faucett.

OTIS, FRANKLIN F., Chairman of Mathematics Department, Michigan College of Mining & Technology, Sault Ste. Marie, Mich. H. L. Crawford, A. B. Bronwell.

PARKINSON, RICHARD W., Instructor of Engineering Drawing, Ohio State University, Columbus, Ohio. E. O. Reed, R. S. Paffenbarger.

PAUL, RALPH L., Instructor of Engineering Drawing, Michigan State College, East Lansing, Mich. D. M. Fullmer, C. L. Brattin.

POERSCHKE, WERNER H., Instructor, University of Houston, Houston, Tex. W. T. Kittinger, Jr., W. B. Lowe.

RALPH, JOHN R., Instructor in Mechanical Engineering, University of Tennessee, Knoxville, Tenn. J. W. Walker, R. L. Maxwell.

SHERMAN, THEODORE A., Associate Professor of English, University of Idaho, Moscow, Idaho. C. O. Reiser, H. W. Silha.

SMEDLEY, FRANCIS J., Assistant Professor of Mechanical Engineering, Seattle University, Seattle, Wash. R. Q. Brown, A. B. Bronwell.

SMITH, LISLE A., Professor of Civil Engineering, Michigan State College, East Lansing, Mich. L. G. Miller, L. C. Price.

SMITH, RAY V., Instructor of Mechanical Engineering, Colorado School of Mines, Golden, Colo. F. R. Campbell, T. E. Payntee.

SPANGLER, MERLIN G., Research Professor in Civil Engineering, Iowa State College, Ames, Ia. W. C. Alsmeyer, A. Higdon.

TOMPKINS, LEE L., Assistant Div. Manager C.E.S., Continental Can Co., Inc., Houston, Tex. C. A. Vogt, W. B. Lowe.

WADSWORTH, JAMES D., Assistant Professor in Forging Department, Utah State Agricultural College, Logan, Utah. J. E. Christiansen, J. Coulam.

WEHRLE, J. ALBERT, Dean of Engineering, University of Dayton, Dayton, Ohio. A. J. Holian, A. R. Weber.

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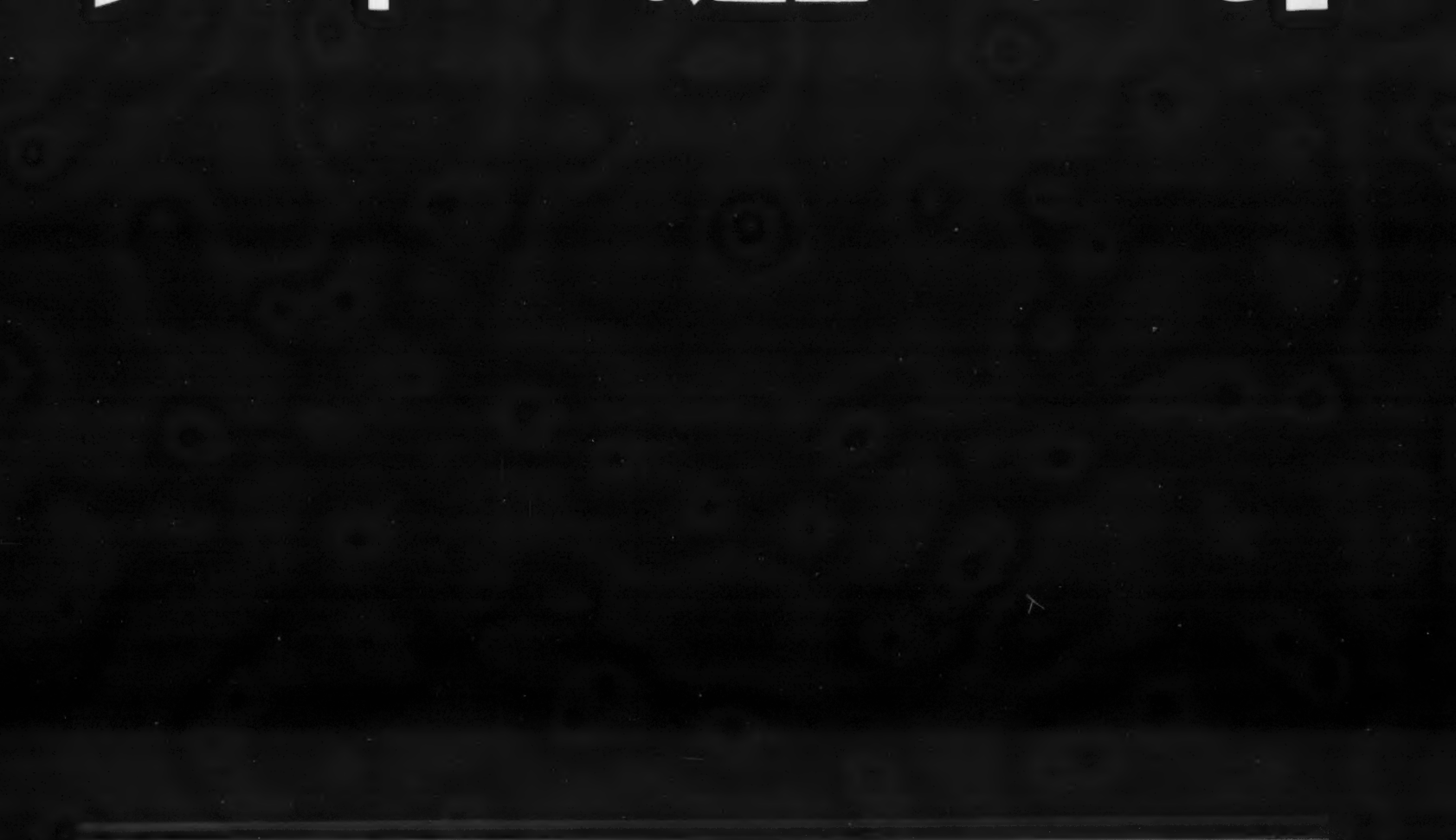

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